ATLAS OF ANATOMY AND SURGICAL APPROACHES IN ORTHOPAEDIC SURGERY

ATLAS OF ANATOMY AND SURGICAL APPROACHES IN ORTHOPAEDIC SURGERY – UPPER EXTREMITY

By

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With a Preface by

ARTHUR STEINDLER



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To my wife, Leonor Olga, and to our sons
Rodolfo Victor and Pablo

Preface

Dr Cosentino s treatise on Anatomy and Approaches of orthopaedic operative procedures is more than a mere addition to the already existing texts of this kind

There is I believe a real point of distinction in the fact that it is all reality and not schematization Layer by layer from the skin incision to depths of the articular or bony structures, the actual anatomic situation is revealed with uncommon accuracy and with painstaking presentation of all nervous and vascular structures The elimination of all diagramatic drawings is well considered Line drawings depict what is to be done in situ as the actual operative area is reached and only too often convey the false impression of simplicity of the procedure

It is assumed in Dr Cosentino s treatise that the operator knows what he wants to do when he gets there a resection an osteosynthesis etc But it is the road to it which counts most and which is the principal object of this book a book on anatomy and approaches With the completion of the approach and the wide exposure of the operative field this goal is reached

To accomplish this objective it requires a person who is both a finished orthopaedic surgeon and a superb anatomist Dr Cosentino is both I cannot but admire the skill and infinite patience which Dr Cosentino applies to his anatomical dissections and which I had many occasions to observe

It is emphasized again that this is not a work on orthopaedic operations with its profusion of methods and technique This is rather a treatise on the anatomy and the approaches for whatever method is ultimately used in situ

This is an endeavour to standardize the road to the operative field rather than the operation itself

Iowa City ARTHUR STEINDLER

Introduction

The first volume of the *Atlas of Anatomy and Surgical Approaches in Orthopaedic Surgery* deals with the *Upper Extremity* while the second and third volumes will be devoted to the *Lower Extremity* and *Neck and Back*, respectively No claims are made to dwell on details of acknowledged surgical techniques for specific operations My only purpose is to demonstrate with accuracy the anatomical structures encountered by the operator from layer to layer

The direct photographic reproductions of the anatomical preparations offer a clear picture of the structures of the specific areas and should serve the surgeon to avoid injuring anatomic elements as he explores the region

Unnecessary duplications of photographs are avoided For instance, reproductions concerning the elbow region are not repeated when dealing with the arm or forearm

The surgeon is restrained by biological principles of tissue regeneration and repair and cannot expose the anatomical structures as widely as is done by the anatomist. However the surgeon cannot afford to ignore the relationships of the important structures in the operative field. To expose adequately the operative field and to better demonstrate the anatomical structures often was necessary to enlarge incisions and to extend periosteal strippings beyond the operative requirements In this respect our dissections are anatomic rather than surgical

The approaches presented are those generally utilized in the field of orthopaedic surgery Simple approaches of easily accessible structures are omitted

Radiographies have been included to show the relationship of the skin incision to the underlying skeletal structures

Iowa City R Cosentino M D

Acknowledgments

This Atlas has been compiled at the suggestion of Dr Arthur Steindler The Orthopaedic Research and Education Foundation provided funds to establish an anatomic-surgical museum at the Orthopaedic Department State University of Iowa I dissected the specimens for this museum The illustrations of this Atlas are photographs of these specimens

I am indebted for valuable suggestions to Drs Arthur Steindler Carroll B Larson I V Ponseti M Bonfiglio W B Gelman and Adrian Flatt. I greatly appreciate the help of Delia J C Carnelli with the manuscript and of Dr Gelman for the tracings of the incisions in the photographs Dr W R Ingram and Dr E W Scheldrup of the Anatomy Department were most helpful in providing a room and specimens for the dissections Mr James A Kent and Mr S Jack Davis took the photographs their skill and patience are greatly appreciated My thanks are due to the publishers Mr Charles C Thomas and Mr Payne Thomas

I gratefully acknowledge the teachings I received at the University of La Plata, Argentina by Dr R R Lambre Head of the Department of Anatomy and Drs F E Christmann F Arena and S Gorostiague who introduced me to the field of Orthopaedic Surgery

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R Cosentino M D

Contents

ATLAS OF ANATOMY AND SURGICAL APPROACHES IN ORTHOPAEDIC SURGERY

ANATOMY OF THE SHOULDER REGION



Fig 1—SUPERFICIAL DISSECTION OF THE PECTORAL REGION

Observe

a—The clavicular and sterno-costal heads of the Pectoralis major muscle.

b—The Cephalic vein and the Deltoid branch of the Acromio-thoracic artery in the infraclavicular or delto-pectoral triangle

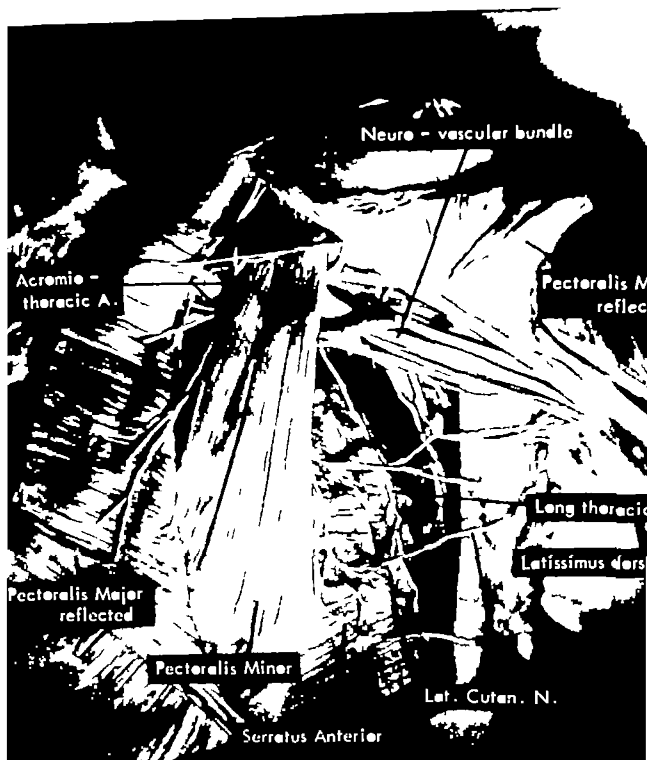


Fig. 2—ANTERIOR ASPECT OF THE AXILLA

The Pectoralis major was cut and reflected observe its insertion into the lateral lip of the bicipital groove of the humerus by means of a bilami nar tendon united along its inferior border

Observe the Pectoralis minor muscle the Cephalic vein and the Deltoid branch of the Acromio-thoracic artery cross in front at its highest portion.

The neuro-vascular bundle is seen behind the Pectoralis minor

Fig. 3—POSTERIOR AND MEDIAL WALLS OF THE AXILLA AND NEURO-VASCULAR BUNDLE

The Pectoralis major and minor muscles were cut and reflected

The posterior wall of the axilla is formed by the Subscapularis, Teres major, and *Latissimus dorsi muscles* Observe the nerve to the Latissimus dorsi muscle and its relation with the Subscapular artery

The medial wall of the axilla is formed by the Serratus anterior muscle. *Observe its Long thoracic nerve. The Lateral cutaneous nerves run parallel* to the muscle fibers

Observe the anastomosis between the posterior branch of the Lateral cutaneous nerve of the third Intercostal nerve and the Intercosto-brachial nerve.

The Axillary artery is surrounded by veins and nerves. The Axillary vein lies on the medial side of the artery and receives the veins corresponding to the branches of the Axillary artery the Cephalic vein, and the comitantes veins of the Brachial artery The Lateral cord lies laterally to the Axillary artery· after giving the Musculo-cutaneous nerve, passes in *front of the Axillary artery to join the Medial cord and form the* Median nerve.

Note the branches arising from the Axillary artery Acromio-thoracic, Lateral thoracic, Anterior humeral circumflex (with a small branch to the Median nerve) and Subscapular artery (with its branch the Circumflex scapular artery)

Observe the Pectoral nerves forming a loop in front of the Axillary artery and extending to the Pectoralis muscles.

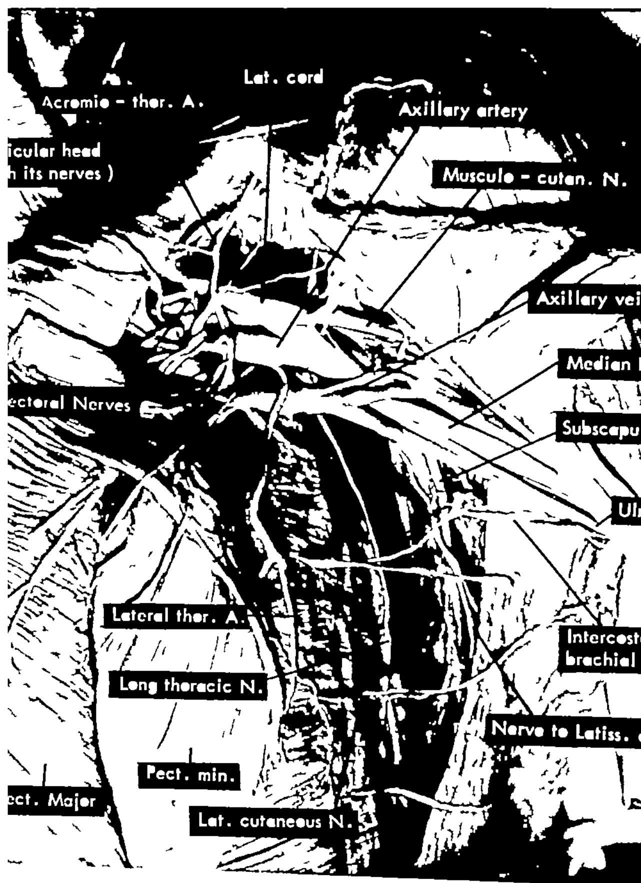

Lat. cord
Acromio - thor. A.
Axillary artery
icular head
h its nerves)
Musculo - cutan. N.
Axillary vei
Median
ectoral Nerves
Subscapu
Ul
Lateral thor. A.
Intercost
brachial
Long thoracic N.
Nerve to Latiss.
Pect. min.
ect. Major
Lat. cutaneous N.



Fig. 4—NEURO-VASCULAR BUNDLE OF THE AXILLA

The tributaries to the Axillary vein were removed A part of the Axillary artery was resected

The Medial cord is first posterolateral to the Axillary artery and passes behind the artery to be located in its medial side and join the lateral cord to form the Median nerve

The Posterior cord lies posteriorly

Observe the Lower subscapular nerve which also supplies the Teres major muscle

Note the Posterior circumflex artery and the Axillary nerve going through the quadrangular space

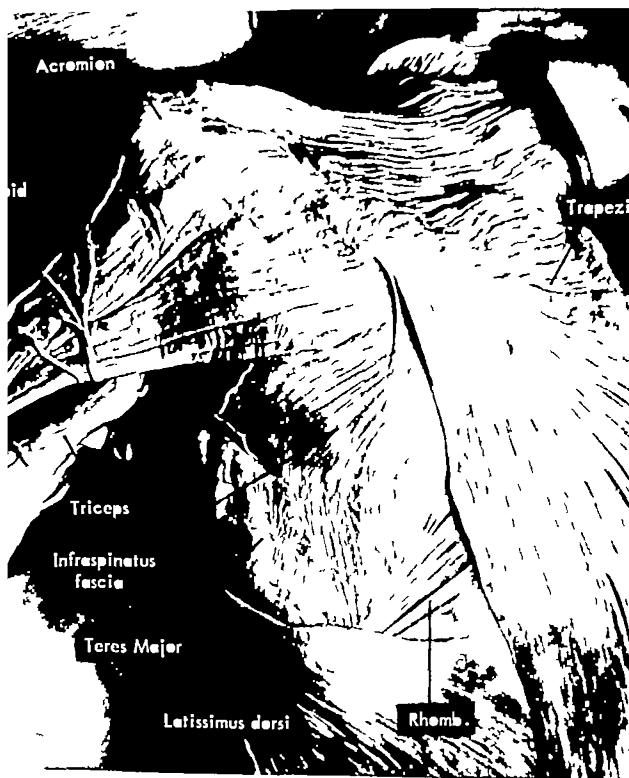


Fig 5—MUSCLES OF THE POSTERIOR ASPECT OF THE SHOULDER

Fig. 6—MUSCLES OF THE POSTERIOR ASPECT OF THE SHOULDER

The Trapezius was cut longitudinally and reflected Observe its motor supply (Accessory nerve) and the second layer of muscles

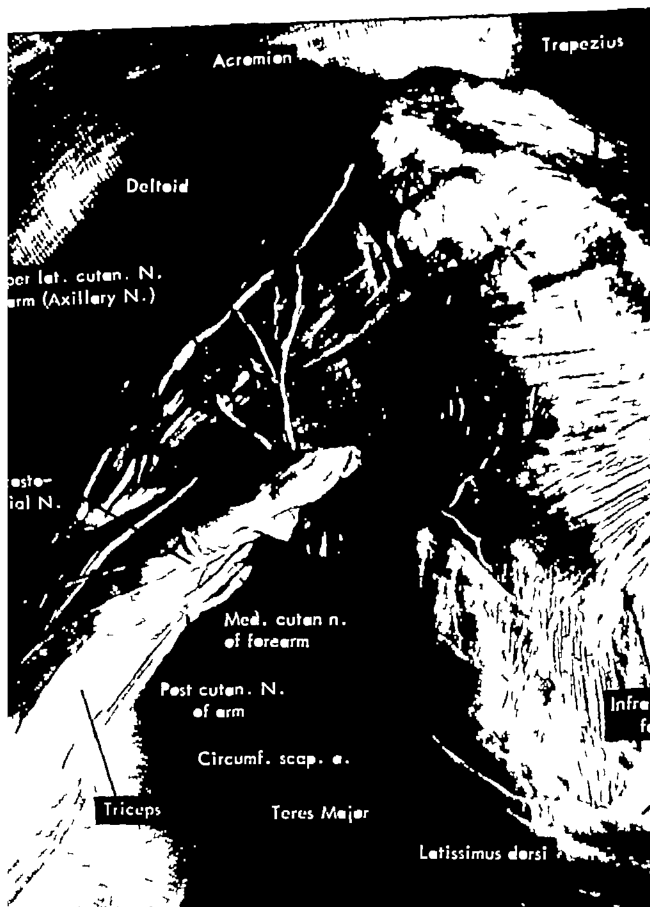


Fig 7—POSTERIOR ASPECT OF THE SHOULDER

bserve how the Latissimus dorsi muscle spirals around the Teres major muscle
ne Upper lateral cutaneous nerve of the arm, branch of the Axillary nerve winds
or border of the Deltoid muscle where it becomes superficial With the arm appli
the thoracic wall, a line dropped vertically from the acromial angle crosses the post

POSTERIOR ASPECT OF THE SHOULDER

Fig. 8—POSTERIOR ASPECT OF THE SHOULDER

The Deltoid muscle was partially cut and reflected.

Observe the long head of the Triceps passing between the Teres minor and Teres major muscles

The quadrangular space is limited by the long head of the Triceps, the Teres minor the tendon of the Teres major and the surgical neck of the humerus The Axillary nerve and the Posterior Circumflex humeral artery pass through the quadrangular space.

The Axillary nerve and accompanying artery wind round the surgical neck of the humerus Their position on the skin surface can be determined by a horizontal line drawn two inches below the lateral border of the acromion

The triangular space is limited by the long head of the Triceps the Teres minor and the Teres major muscles Through this triangular space passes the Circumflex scapular artery

The triangular space limited by the Teres major the long and the lateral heads of the Triceps gives passage to the Radial nerve and the Profunda brachii artery

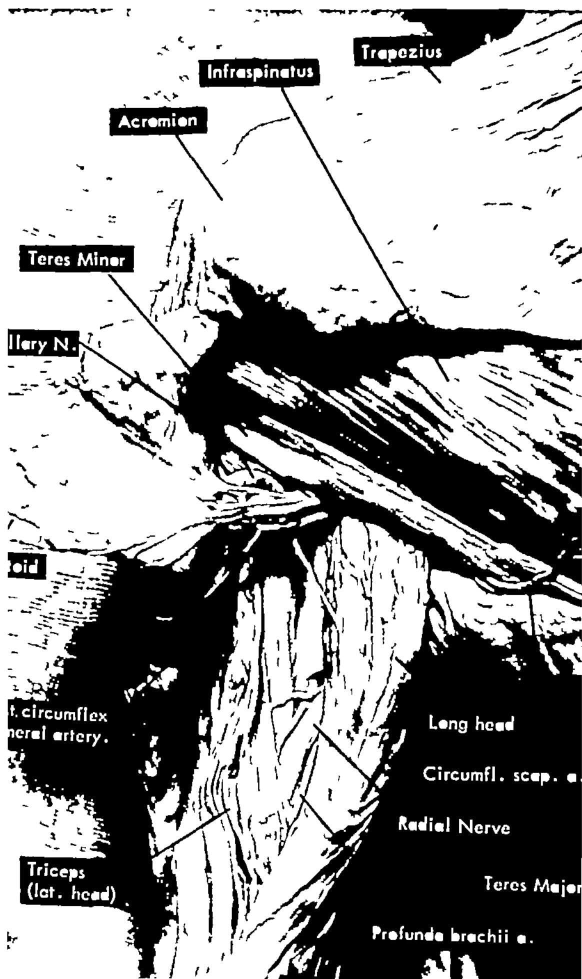

Trapezius
Infraspinatus
Acromion
Teres Minor
llary N.
oid
t. circumflex
neral artery.
Long head
Circumfl. scap. a.
Radial Nerve
Teres Major
Triceps
(lat. head)
Profunda brachii a.



Fig. 9—POSTERIOR ASPECT OF THE SHOULDER
SUPRASPINOUS REGION

The Trapezius muscle was separated from its insertions in the spine of the scapula and clavicle and reflected.

The Supraspinatus muscle was partially resected.

Observe

a—The Suprascapular artery crossing above the suprascapular ligament

b—The Suprascapular nerve passing through the foramen

c—The relationship between Omo-hyoid muscle and Suprascapular nerve.

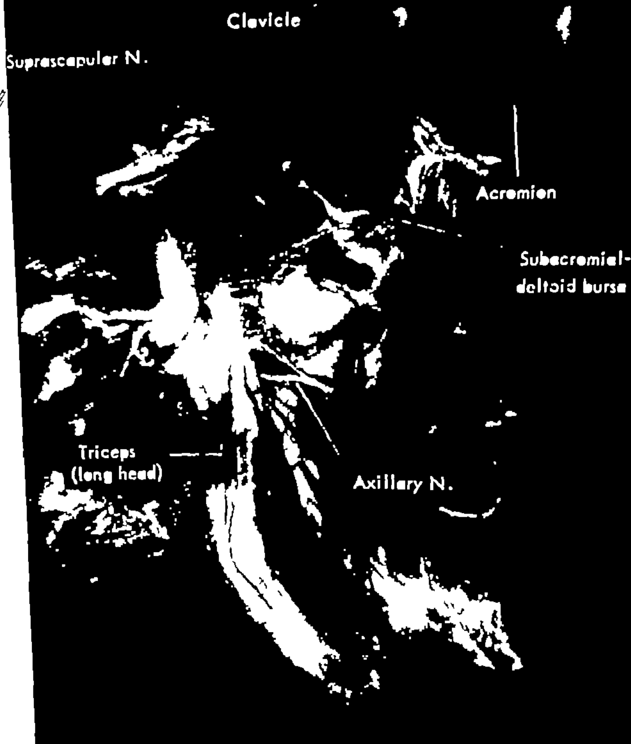


Fig. 10—SHOULDER JOINT AND SUBACROMIO-DELTOID BURSA—SENSORY SUPPLY

The acromion and the clavicle were osteotomized and reflected with the Deltoid muscle.

The Suprascapular nerve sends sensory twigs to the capsule of the shoulder joint and to the subacromio-deltoid bursa

The Axillary nerve sends twigs to the joint capsule as it traverses the quadrangular space

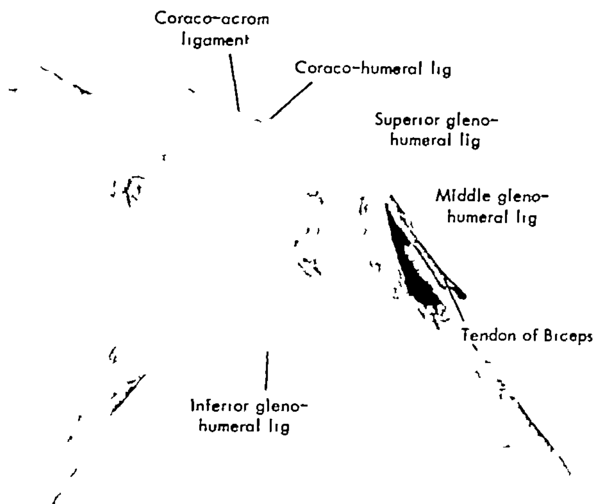


Fig. 11—LIGAMENTS OF THE SHOULDER JOINT

APPROACHES TO THE SHOULDER JOINT REGION



ANTERIOR APPROACH TO THE SHOULDER JOINT REGION

I—S-shaped skin incision beginning at the anterior border of the acromion and extending obliquely to the coracoid process and then downward along the delto-pectoral groove (Fig 12)

Fig. 13—ANTEROPOSTERIOR ROENTGENOGRAM OF THE LEFT SHOULDER



Fig. 13—ANTEROPOSTERIOR ROENTGENOGRAM OF THE LEFT SHOULDER



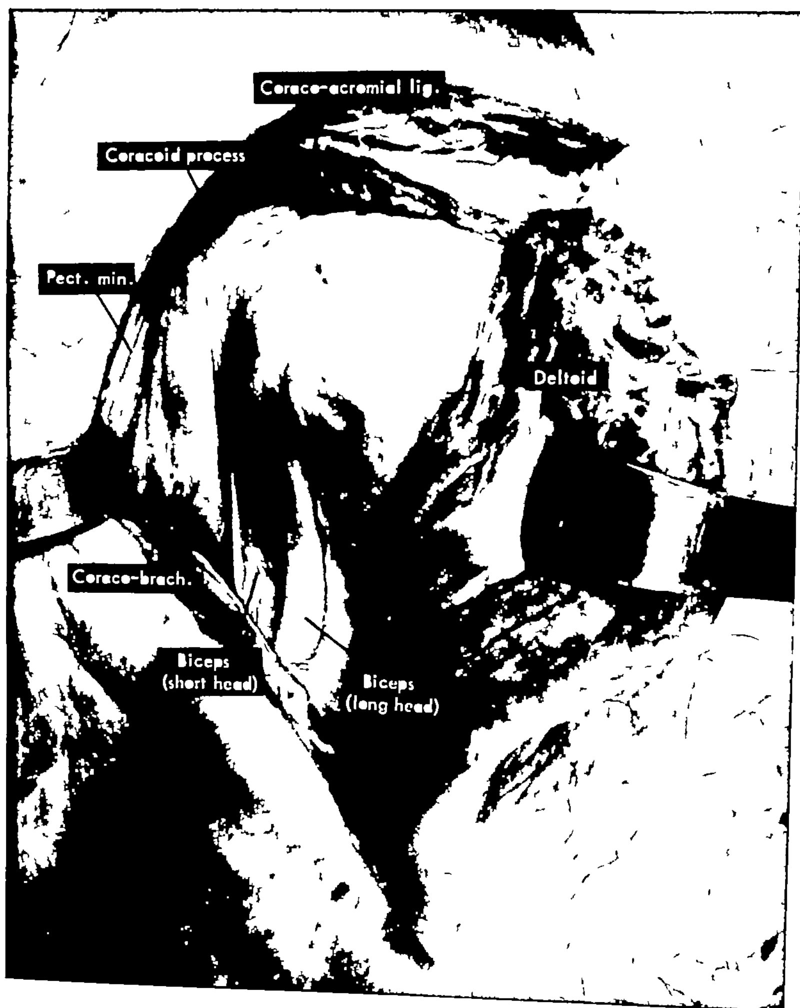
II–The Cephalic vein is identified extending along the delto-pectoral groove (Fig 14)

Fig 13—ANTEROPOSTERIOR ROENTGENOGRAM OF THE LEFT SHOULDER



II–The Cephalic vein is identified, extending along the delto pectoral groove (Fig 14)

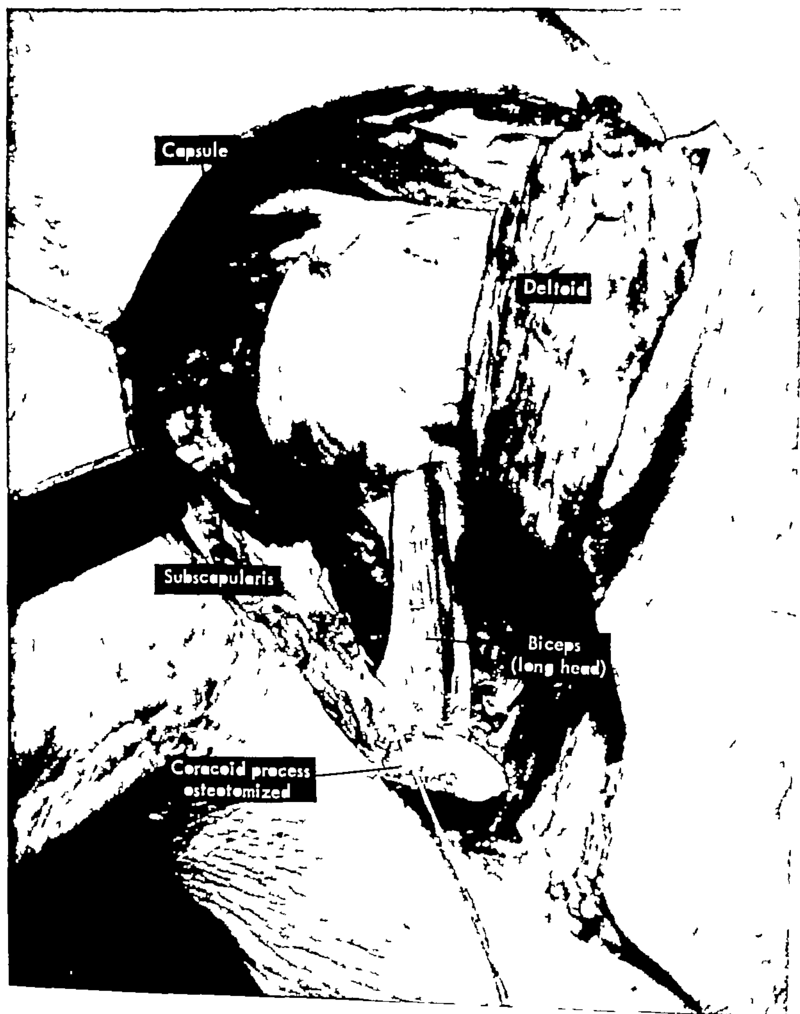
III—The Cephalic vein with the Pectoralis major muscle are retracted medially the Deltoid muscle is retracted laterally after cutting across the anterior portion of this muscle near the clavicle Observe the tendon of the long head of the Biceps (the tendon sheath was removed) and the coracoid process with the insertions of the short head of the Biceps the Coraco-brachialis and the Pectoralis minor muscles A portion of the coraco-acromial ligament can be seen (Fig. 15)


Coraco-acromial lig.
Coracoid process
Pect. min.
Deltoid
Coraco-brach.
Biceps
(short head)
Biceps
(long head)

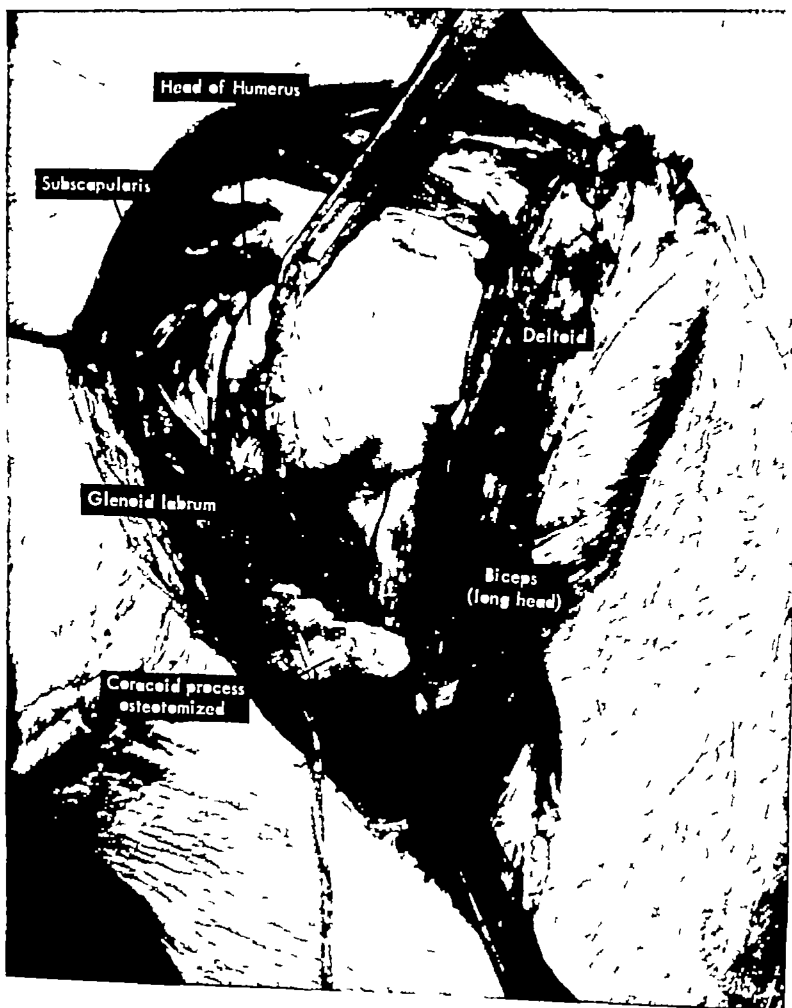
IV—The tip of the coracoid process has been osteotomized and reflected downwards with the attached short head of the Biceps and Coraco-brachialis muscles Observe the Musculo-cutaneous nerve entering the Coraco-brachialis muscle In the depth of the region the Sub-scapularis muscle is seen passing forward and outward to insert in the lesser tuberosity of the humerus (Fig 16)


Subscapularis
Pect. min.
Musculo-cutan. N.
Deltoid
Biceps
(long head)
Coracoid process
osteotomized

V—The Subscapularis muscle has been tenotomized near its insertion into the lesser tuberosity of the humerus separated from the underlying anterior capsule of the shoulder joint and retracted medially (Fig. 17)


Capsule
Deltoid
Subscapularis
Biceps
(long head)
Coracoid process
osteotomized

VI—The capsule of the shoulder joint has been opened by a vertical incision The head of the humerus and the anterior border of the glenoid are seen (Fig. 18)


Head of Humerus
Subscapularis
Deltoid
Glenoid labrum
Biceps
(long head)
Coracoid process
osteotomized

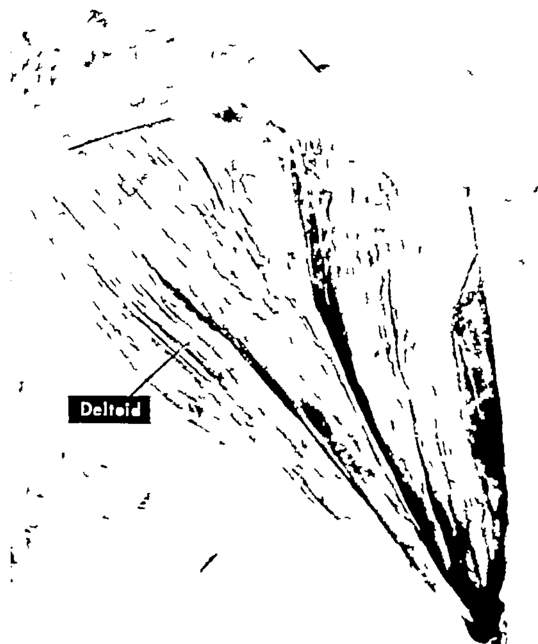


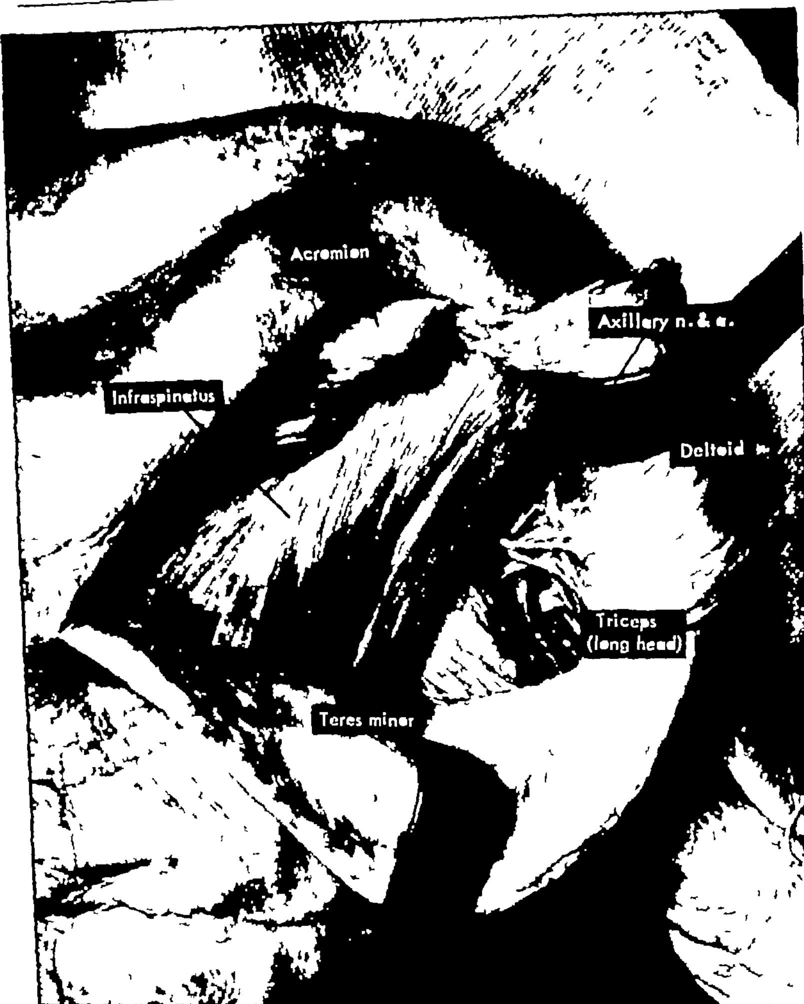
POSTERIOR APPROACH TO THE SHOULDER JOINT REGION

I—The skin incision begins at the junction of the middle and inner thirds of the spine of the scapula, and continues outwards about one inch below this spine The incision then curves downwards over the posterior aspect of the shoulder region for approximately one inch and a half (remember not to damage the Upper lateral cutaneous nerve of the arm sensory branch of the Axillary nerve) (Fig. 19)



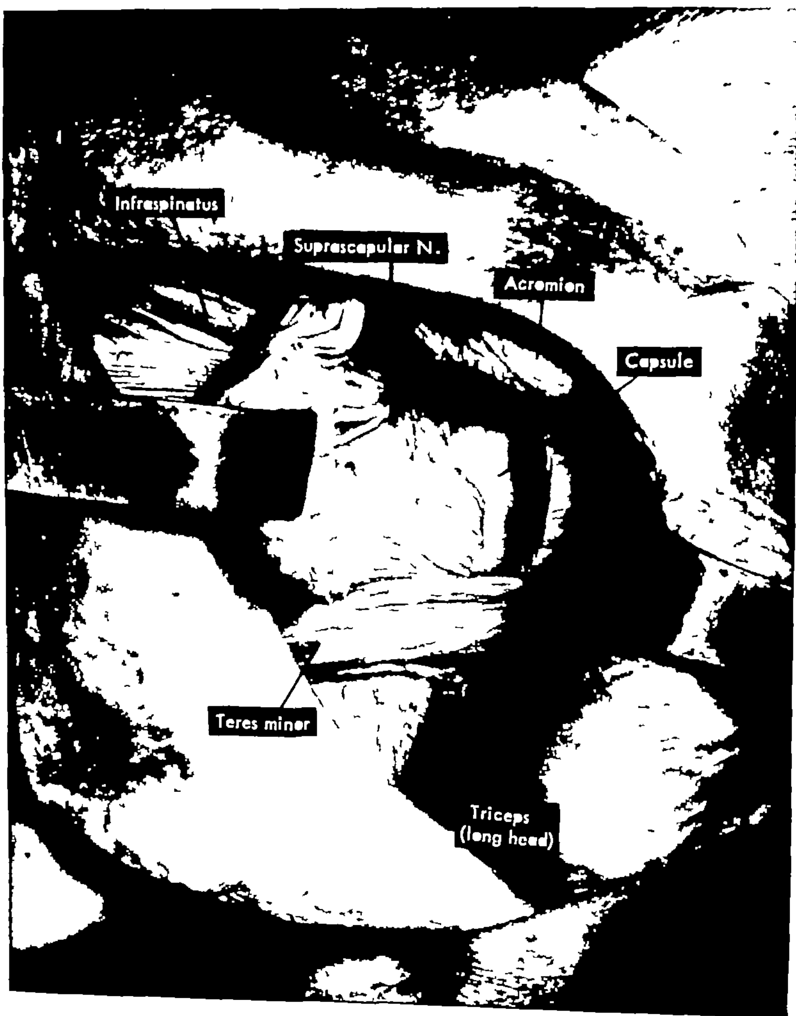
Fig. 20—POSTEROANTERIOR ROENTGENOGRAM OF THE RIGHT SHOULDER

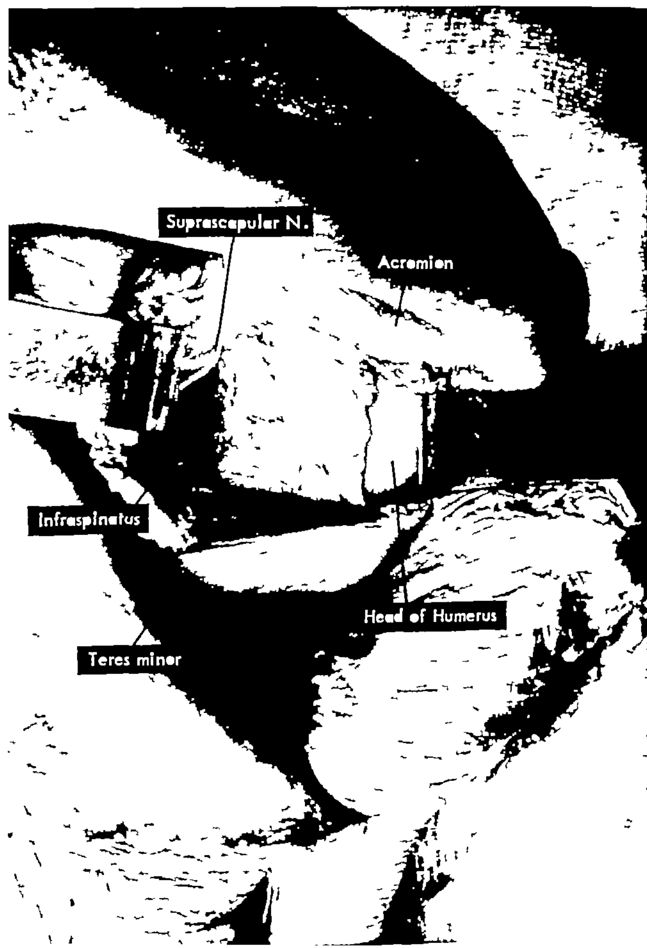

Deltoid



III–The Deltoid has been detached from its insertion on the spine of the scapula and reflected laterally
The Infraspinatus Teres minor and long head of the Triceps are visualized. The long head of the Triceps and the Axillary nerve and vessels

IV—The Infraspinatus muscle has been sectioned and retracted medially The Suprascapular nerve runs over the lateral border of the spine of the scapula and pierces the deep face of the Infraspinatus muscle The posterior aspect of the neck of the scapula and the joint capsule can be seen (Fig 23)


Infraspinatus
Suprascapular N.
Acromion
Capsule
Teres minor
Triceps
(long head)


Suprascapular N.
Acromion
Infraspinatus
Head of Humerus
Teres minor

ANATOMY OF THE ARM

Fig. 25—ANTERIOR ASPECT OF THE ARM

The muscle belly of the Biceps is in front of the Brachialis

The Median nerve runs along the medial border of the Biceps

Close to the elbow region the Musculo-cutaneous nerve is at the lateral border of the Biceps and pierces the fascia to become the Lateral cutaneous nerve of the forearm

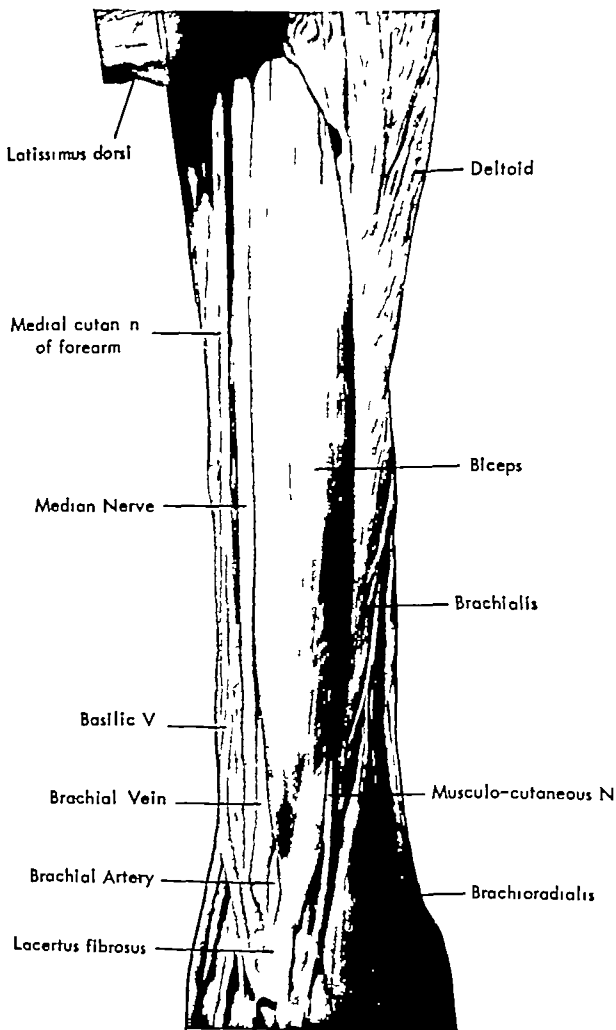

Latissimus dorsi
Deltoid
Medial cutan n
of forearm
Biceps
Median Nerve
Brachialis
Basilic V
Brachial Vein
Musculo-cutaneous N
Brachial Artery
Brachioradialis
Lacertus fibrosus

Fig 26—POSTERIOR ASPECT OF THE ARM

Observe the long and lateral heads of the Triceps The deep enveloping fascia merges at the sides with the lateral and medial intermuscular septums which were not removed.

The Ulnar nerve is behind the medial intermuscular septum and medial epicondyle and is in contact with the medial head of the Triceps.

Observe the subcutaneous oleocranon bursa.

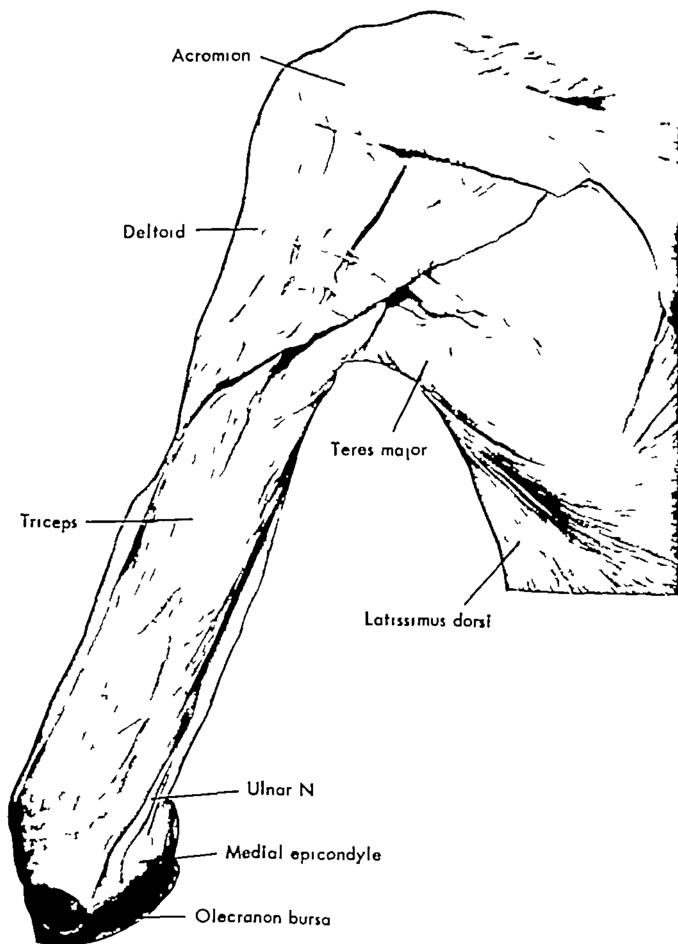

Acromion
Deltoid
Triceps
Teres major
Latissimus dorsi
Ulnar N
Medial epicondyle
Olecranon bursa

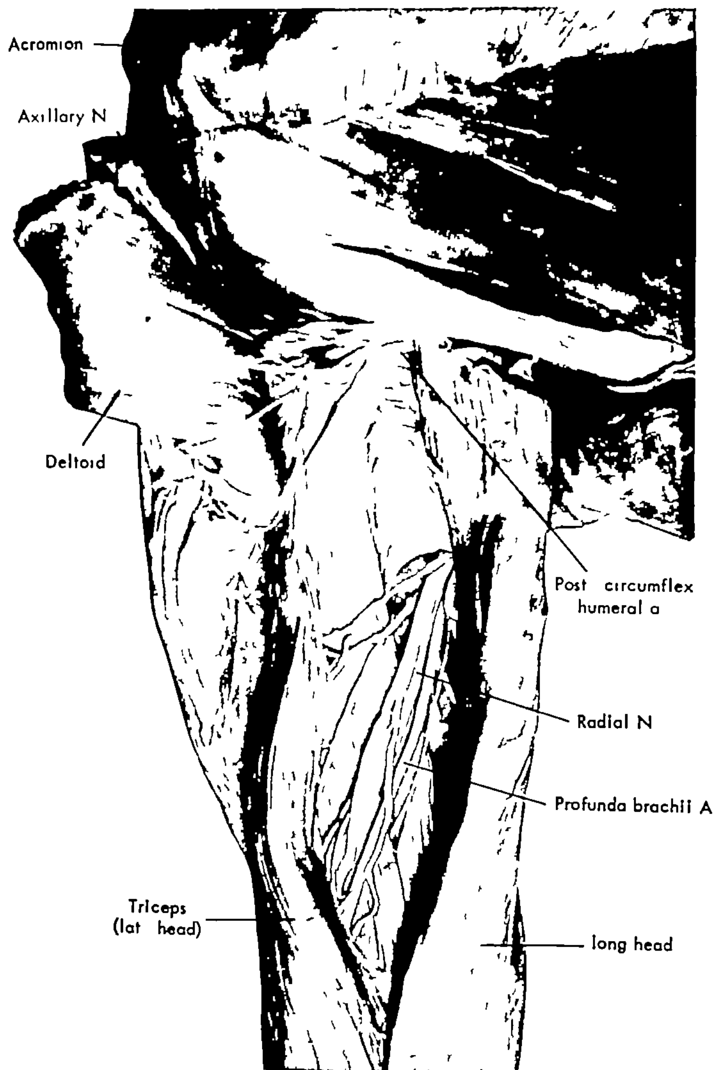
Fig 27—POSTERIOR ASPECT OF THE ARM

The long and lateral heads of the Triceps lie together over the medial head

Observe the Radial nerve and the Profunda brachii artery

The Radial nerve leaves the spiral groove and pierces the lateral intermuscular septum to penetrate into the anterior compartment of the arm four inches above the lateral epicondyle

The Deltoid muscle was retracted upwards to show the Axillary nerve and the Posterior circumflex humeral artery



Acromion
Axillary N
Deltoid
Post circumflex humeral a
Radial N
Profunda brachii A
Triceps (lat head)
long head

Fig. 28—LATERAL ASPECT OF THE ARM

Observe

a—The muscles of the arm

b—The Lower lateral cutaneous nerve of the arm the Posterior cutaneous nerve of the forearm and the Musculo-cutaneous nerve

c—The lateral intermuscular septum.

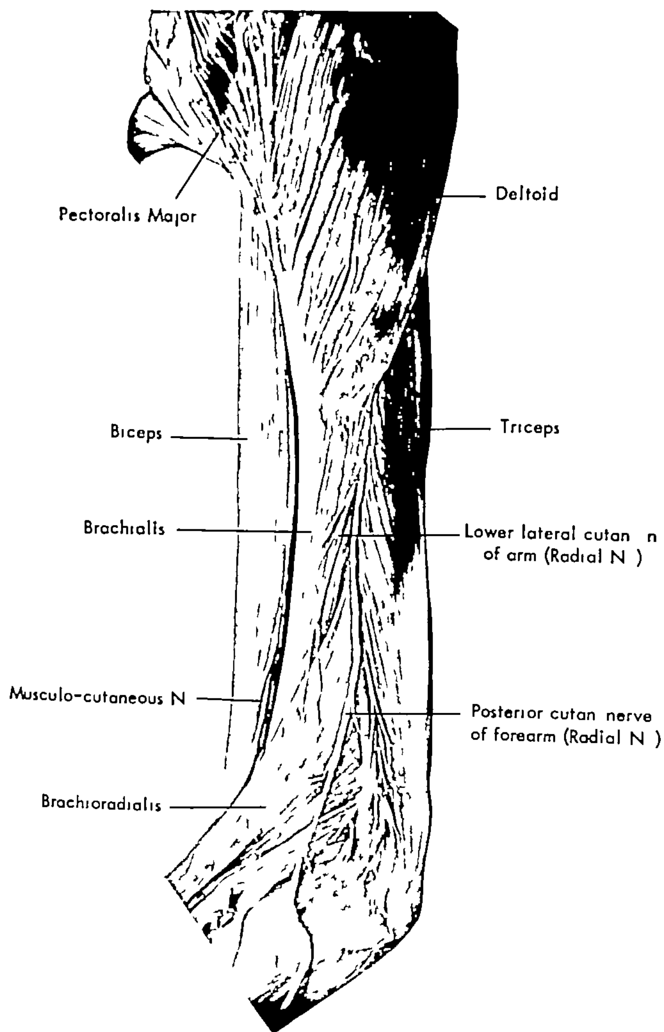

Pectoralis Major
Deltoid
Biceps
Triceps
Brachialis
Lower lateral cutan n of arm (Radial N)
Musculo-cutaneous N
Posterior cutan nerve of forearm (Radial N)
Brachioradialis

Fig. 28—LATERAL ASPECT OF THE ARM

Observe

a—The muscles of the arm

b—The Lower lateral cutaneous nerve of the arm, the Posterior cutaneous nerve of the forearm and the Musculo-cutaneous nerve.

c—The lateral intermuscular septum

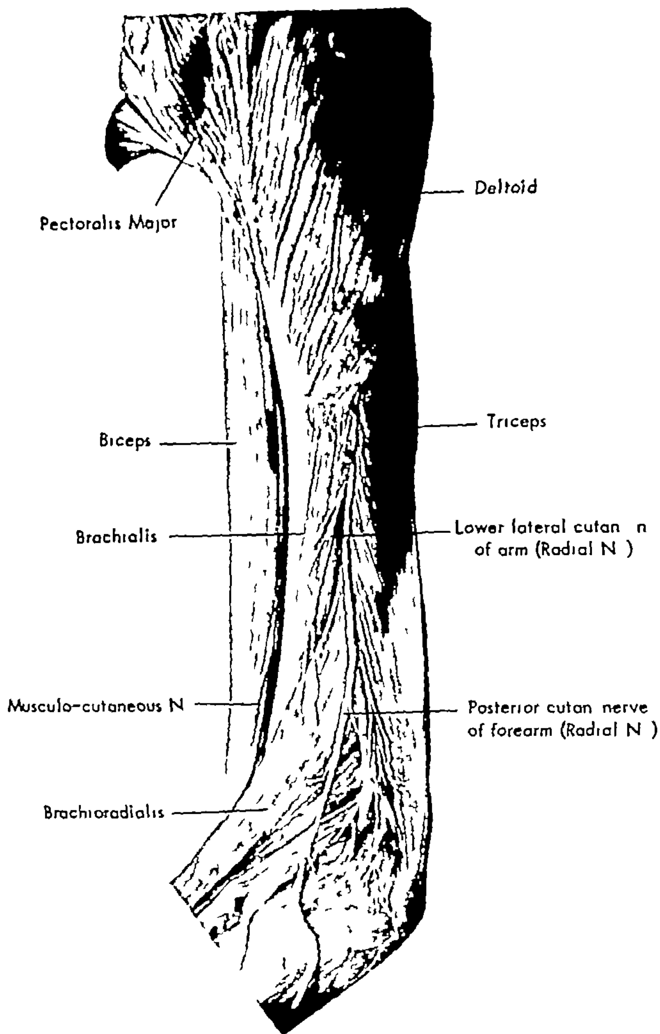

Deltoid
Pectoralis Major
Triceps
Biceps
Brachialis
Lower lateral cutan n
of arm (Radial N)
Musculo-cutaneous N
Posterior cutan nerve
of forearm (Radial N)
Brachioradialis

Fig. 29—MEDIAL ASPECT OF THE ARM

Observe

a—The Median nerve crosses very obliquely in front of the Brachial artery

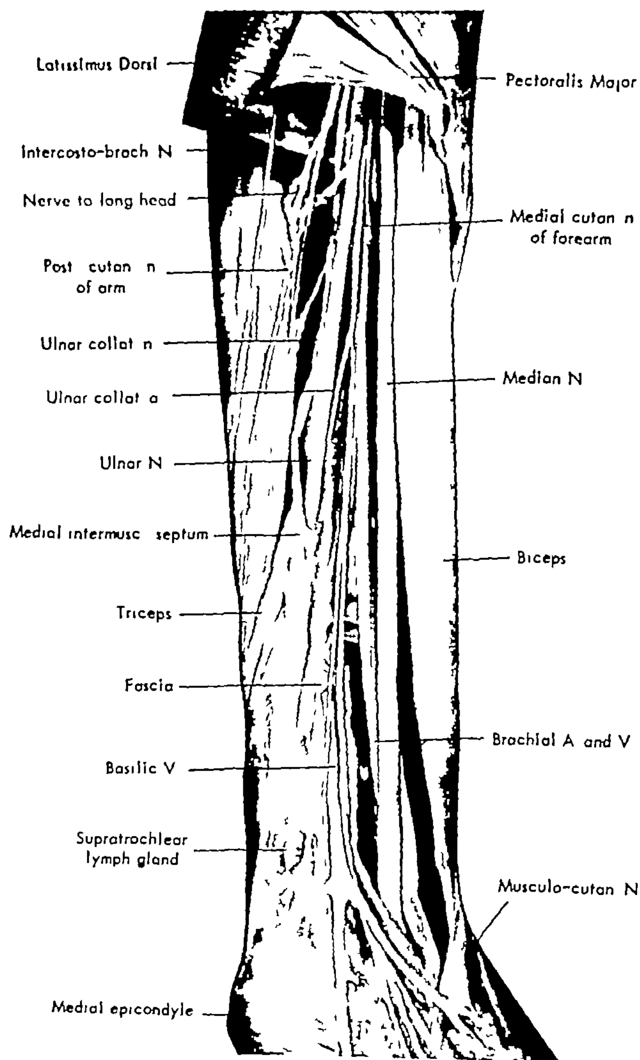
b—The Ulnar nerve is in intimate relationship with the Brachial artery in the upper third of the arm and then crosses behind the medial inter muscular septum accompanied by the Superior ulnar collateral artery and the Ulnar collateral nerve (branch of the Radial nerve to the medial head of the Triceps)

c—The motor nerves to the long head of the Triceps

d—The Posterior cutaneous nerve of the arm and the Intercostobrachial nerve.

e—The Medial cutaneous nerve of the forearm and the Basilic vein.

f—The supratrochlear Lymph node



Latissimus Dorsi
Intercosto-brach N
Nerve to long head
Post cutan n of arm
Ulnar collat n
Ulnar collat a
Ulnar N
Medial intermusc septum
Triceps
Fascia
Basilic V
Supratrochlear lymph gland
Medial epicondyle
Pectoralis Major
Medial cutan n of forearm
Median N
Biceps
Brachial A and V
Musculo-cutan N

Fig. 29—MEDIAL ASPECT OF THE ARM

Observe

a—The Median nerve crosses very obliquely in front of the Brachial artery

b—The Ulnar nerve is in intimate relationship with the Brachial artery in the upper third of the arm and then crosses behind the medial inter muscular septum accompanied by the Superior ulnar collateral artery and the Ulnar collateral nerve (branch of the Radial nerve to the medial head of the Triceps)

c—The motor nerves to the long head of the Triceps

d—The Posterior cutaneous nerve of the arm and the Intercostobrachial nerve

e—The Medial cutaneous nerve of the forearm and the Basilic vein

f—The supratrochlear Lymph node

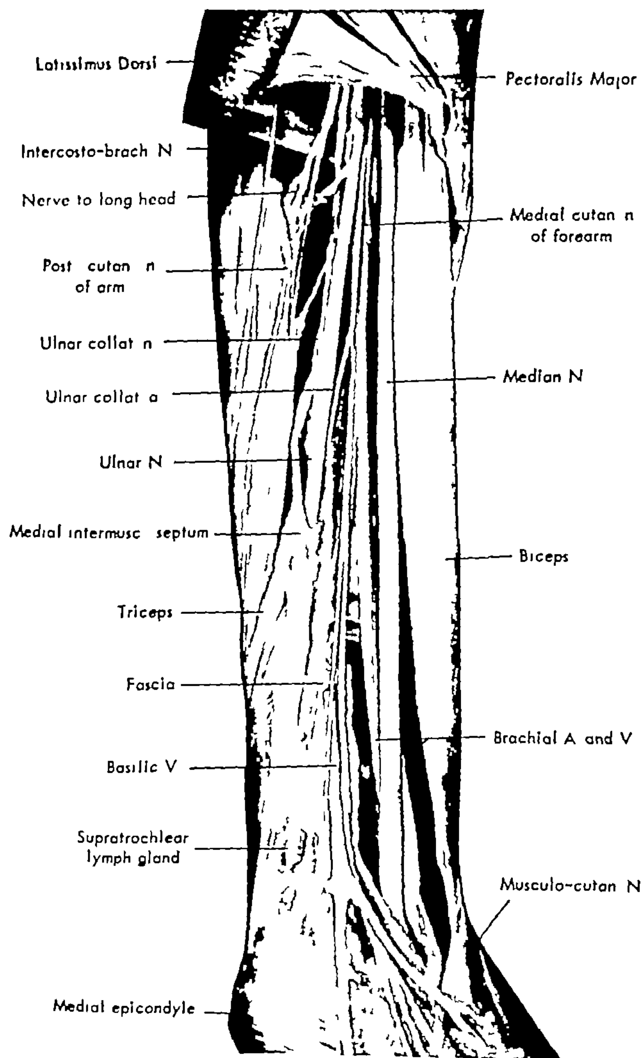

Latissimus Dorsi
Intercosto-brach N
Nerve to long head
Post cutan n
of arm
Ulnar collat n
Ulnar collat a
Ulnar N
Medial intermusc septum
Triceps
Fascia
Basilic V
Supratrochlear
lymph gland
Medial epicondyle
Pectoralis Major
Medial cutan n
of forearm
Median N
Biceps
Brachial A and V
Musculo-cutan N

Fig. 30—MEDIAL ASPECT OF THE ARM

Observe

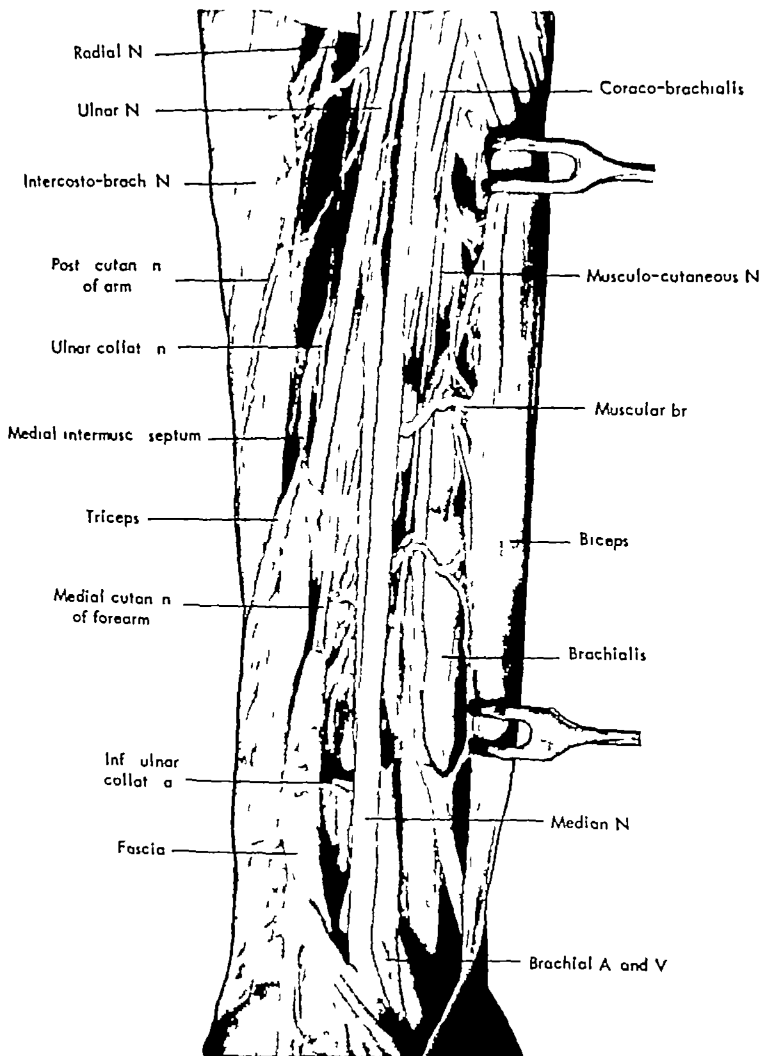
a—The Musculo-cutaneous nerve runs between the Biceps and Brachialis muscles and inervates both muscles

b—The Radial nerve is partially shown in the highest part of the arm behind the Brachial artery

c—The relationship between the Median nerve and Brachial artery

d—The Inferior ulnar collateral artery and muscular branches from the Brachial artery

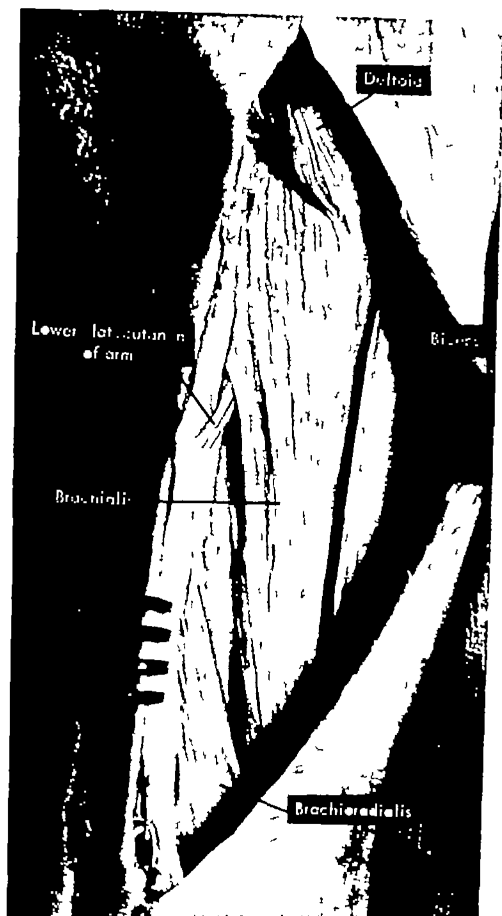
e—The fascia is reflected with the Medial cutaneous nerve of the forearm and the Basilic vein


Radial N
Ulnar N
Intercosto-brach N
Post cutan n of arm
Ulnar collat n
Medial intermusc septum
Triceps
Medial cutan n of forearm
Inf ulnar collat a
Fascia
Coraco-brachialis
Musculo-cutaneous N
Muscular br
Biceps
Brachialis
Median N
Brachial A and V

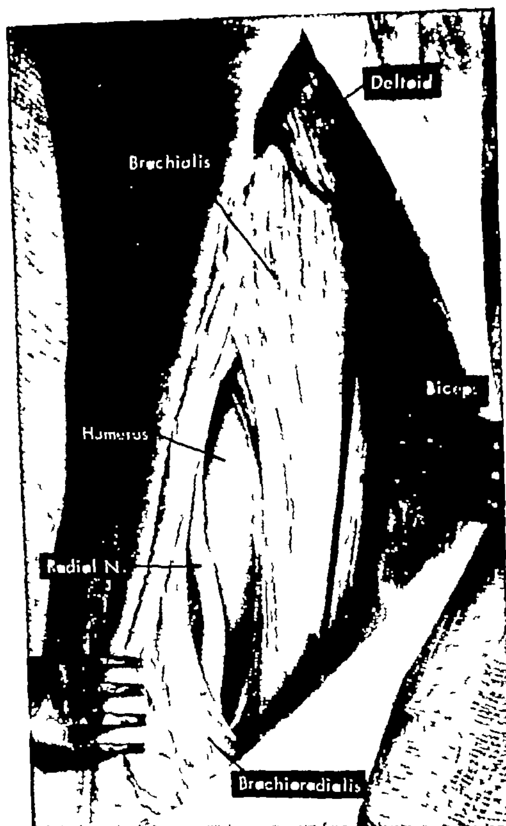


LATERAL APPROACH TO THE MIDDLE THIRD OF THE HUMERUS

1–The skin incision begins at the anterior border of the distal portion of the Deltoid muscle, and extends distally *along* the lateral aspect of the arm (Fig. 31)



II—The deep fascia is incised longitudinally in front of the lateral inter muscular septum Observe the Deltoid the Brachialis the Brachioradialis and the Biceps muscles (Fig 32)

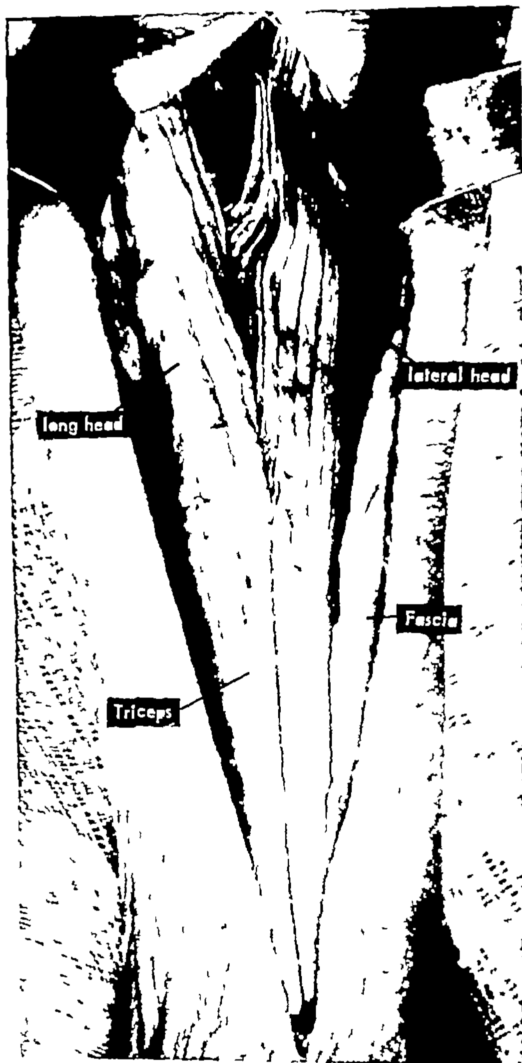


III—The Radial nerve is found running deep in the groove formed between the *Brachioradialis* and Brachialis muscles and is isolated Retracting the Brachialis forward and Brachioradialis posteriorly the periosteum is incised longitudinally to expose the shaft of the humerus
To expose the upper third of the humerus the Brachialis is desinserted and the incision continues along the anterior border of the Deltoid (Fig. 33)



POSTERIOR APPROACH TO THE HUMERUS

I—The skin incision runs along the midline of the posterior aspect of the arm it begins one inch below the posterior border of the Deltoid muscle and may be extended distally to the olecranon fossa (Fig. 34)



11—The deep fascia is incised longitudinally and the long and lateral heads of the Triceps muscle are exposed Observe the gap between these two heads of the Triceps (Fig 35)

III—The gap between the two superficial heads of the Triceps is widely opened by sharp dissection
The medial head of the Triceps the Radial nerve with its branches, and the Profunda brachii artery are now exposed (Fig 36)



Radial N.
Prof. brachii a.
Triceps (lat. head)
medial head

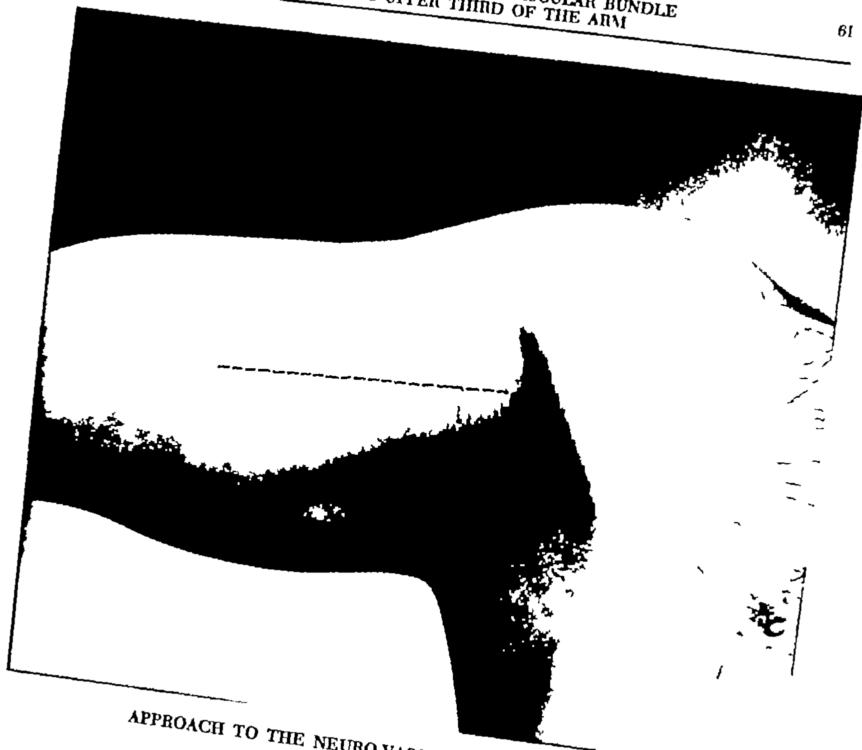
Radial N.

medial head

Triceps
(lat. head)

Prof. brachii a.

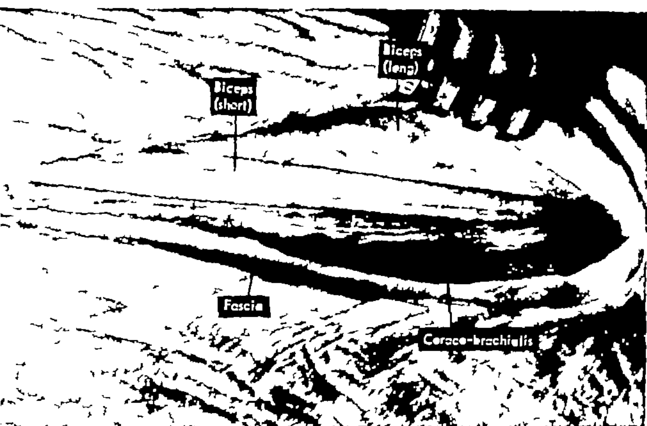
Humerus



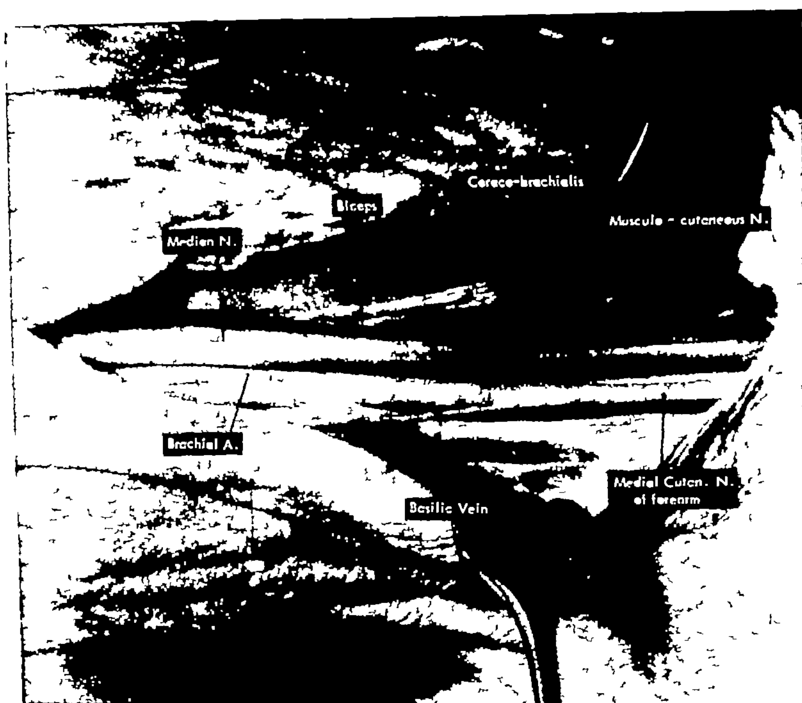
APPROACH TO THE NEURO-VASCULAR BUNDLE AT THE UPPER THIRD OF THE ARM

I—The arm is placed in abduction with the forearm and hand in supination. The skin incision extends along the medial border of the Coracobrachialis muscle (Fig 38)

APPROACH TO THE NEURO-VASCULAR BUNDLE AT THE UPPER THIRD OF THE ARM

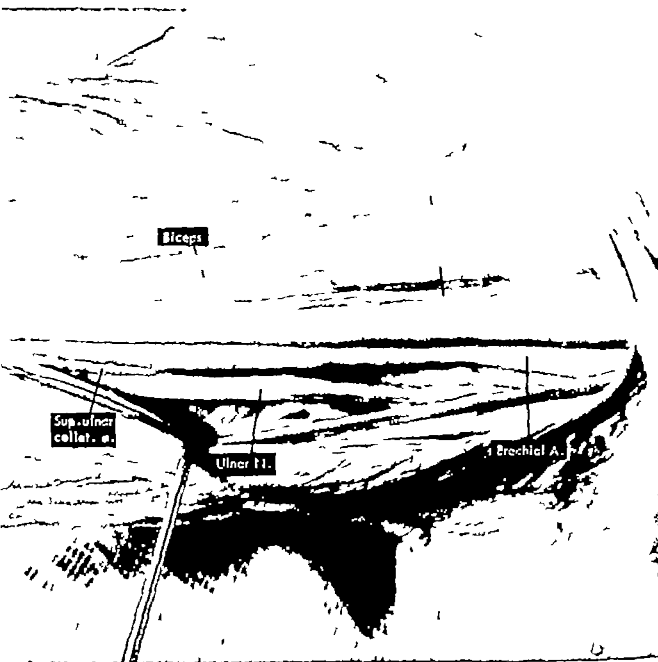


I–The deep fascia is incised longitudinally The Coraco-brachialis and the short and long heads of the Biceps are seen (Fig. 39)



III—The Coraco-brachialis muscle is retracted The Musculo-cutaneous nerve is seen entering the medial part of this muscle Observe the Median nerve running along the Brachial artery deep and anterior to the Medial cutaneous nerve of the forearm and the Basilic vein (Fig 40)

APPROACH TO THE NEURO-VASCULAR BUNDLE
AT THE UPPER THIRD OF THE ARM



IV—The Medial cutaneous nerve of the forearm and the Basilic vein are retracted *The Ulnar nerve lies deep and medial to the* Brachial artery The brachial veins were resected (Fig. 41)

ANATOMY OF THE ELBOW

Fig. 42—ANTERIOR ASPECT OF THE ELBOW SUPERFICIAL LAYER

The Musculo-cutaneous nerve descends between the Biceps and Brachialis and gives motor branches to these muscles Above the fold of the elbow the nerve perforates the lateral aspect of the fascia and becomes subcutaneous Here assumes an intimate relation with the Cephalic vein. Branches from the Musculo-cutaneous nerve, now named Lateral cutaneous nerve of the forearm supply the sensory innervation to the anterolateral part of the forearm

The Medial cutaneous nerve of the forearm perforates the brachial fascia through the same opening as the Basilic vein This occurs usually at the middle third of the arm In our specimen the perforation is at the lower third The nerve divides in several branches which supply the sensory innervation to the neighboring areas of the arm and the anteromedial portion of the forearm

The Medial cutaneous nerve of the arm furnishes sensory innervation to the medial portion of the arm

All structures are subcutaneous resting upon the fascia.

Observe the large communicating vein which establishes an anastomosis between the superficial and the deep venous system

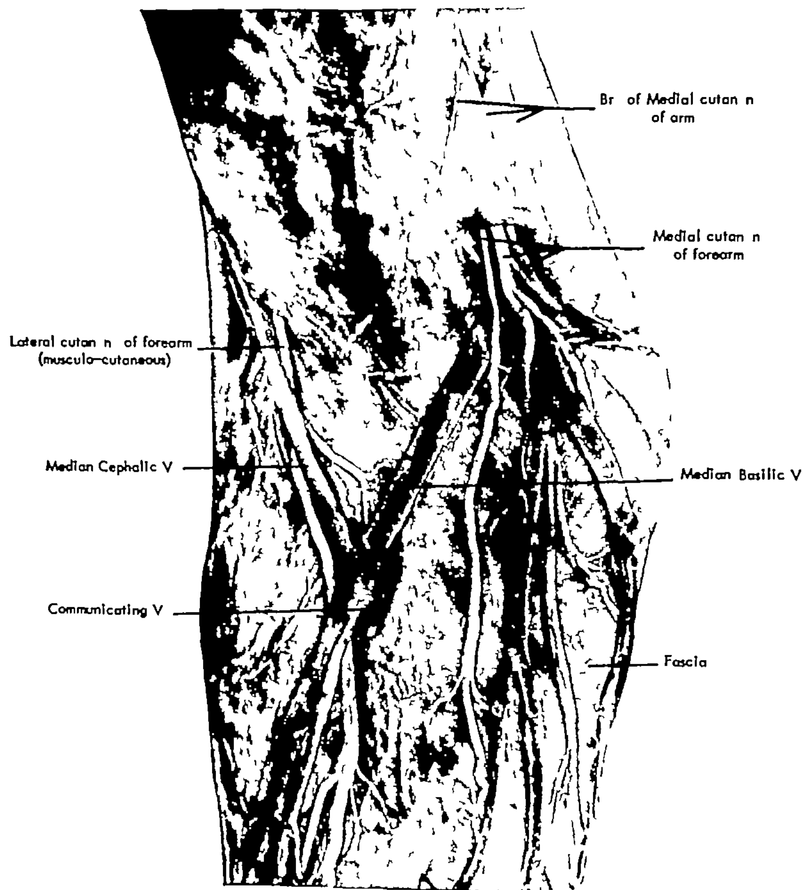

Br of Medial cutan n
of arm
Medial cutan n
of forearm
Lateral cutan n of forearm
(musculo-cutaneous)
Median Cephalic V
Median Basilic V
Communicating V
Fascia

Fig. 43—ANTERIOR ASPECT OF THE ELBOW DEEP STRUCTURES

The fascia has been removed.

Three muscle groups are encountered the central and proximal group is formed by the Biceps and the Brachialis underneath From the tendon of the Biceps springs the bicipital aponeurosis or lacertus fibrosus. The lateral muscle group is formed by the Brachioradialis the Extensor carpi radialis longus and the Extensor carpi radialis brevis The medial muscle group is formed by the Pronator teres the Flexor carpi radialis the Palmaris longus and the Flexor carpi ulnaris

The Brachial artery and veins and the Median nerve lay between the central and the medial muscle groups

The Radial recurrent artery and the Radial nerve are found deep in the groove between the central and the lateral muscle groups At the level of the elbow joint the Radial nerve divides into two terminal branches a superficial sensory branch and a deep motor branch (Posterior inter osseous nerve) The former descends the forearm accompanying the Radial artery the latter dives into the Supinator brevis to reach the posterior aspect of the forearm

Observe the Musculo-cutaneous nerve.

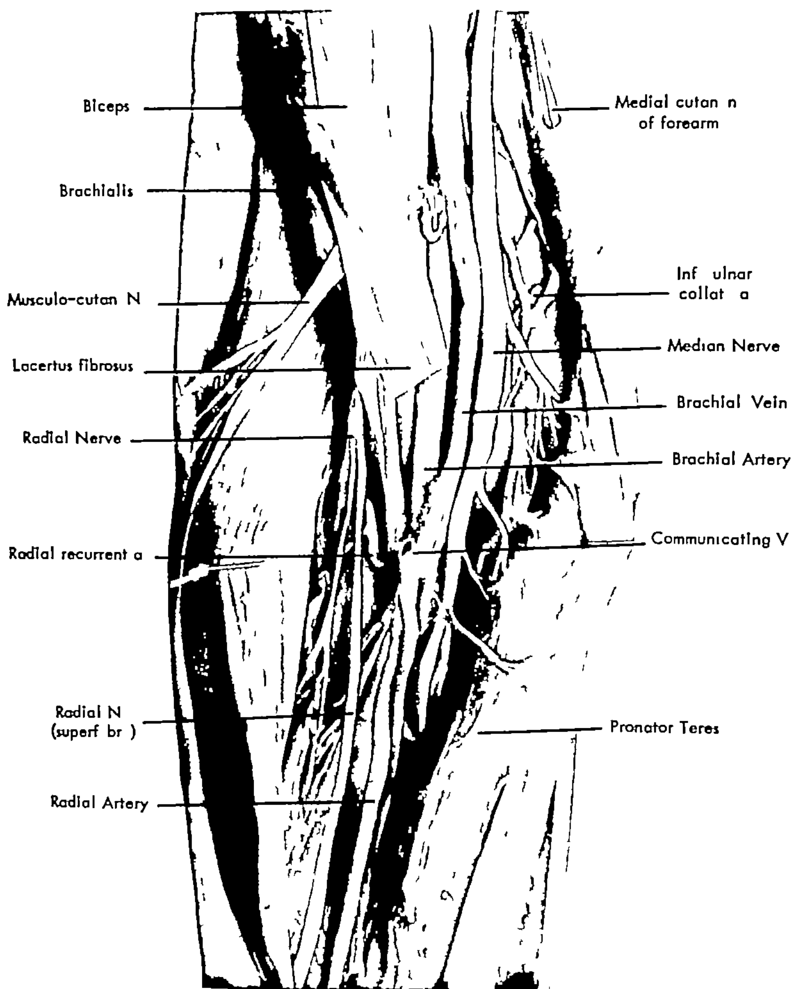
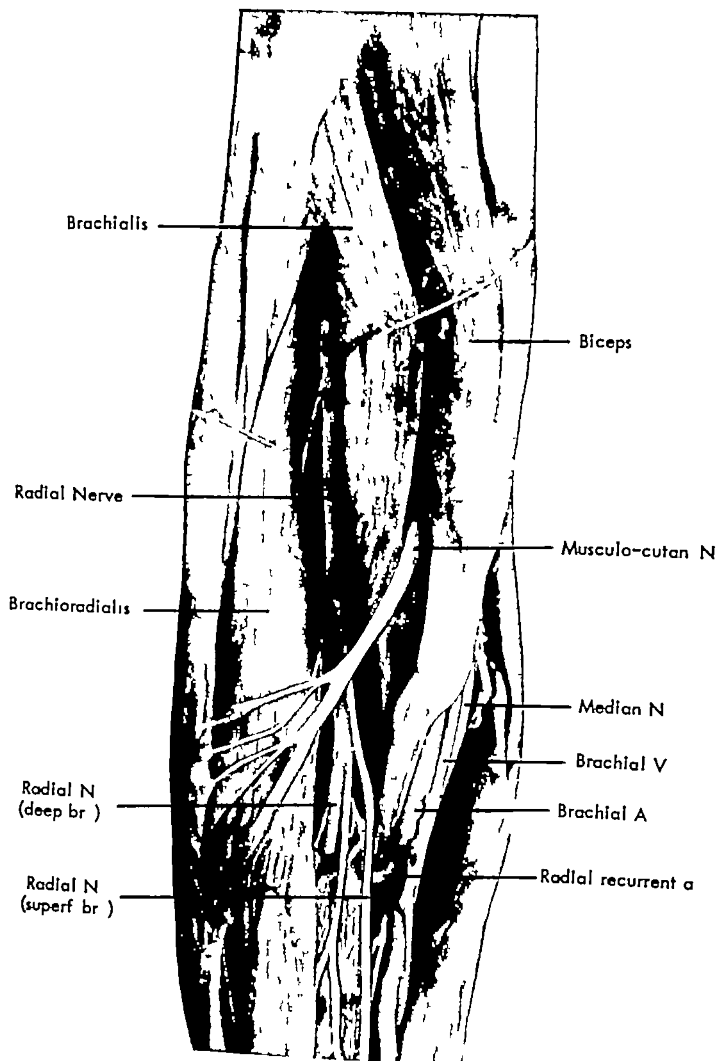

Biceps
Brachialis
Musculo-cutan N
Lacertus fibrosus
Radial Nerve
Radial recurrent a
Radial N
(superf br)
Radial Artery
Medial cutan n
of forearm
Inf ulnar
collat a
Median Nerve
Brachial Vein
Brachial Artery
Communicating V
Pronator Teres

Fig. 44—ANTEROLATERAL VIEW OF THE SAME SPECIMEN AS IN FIGURE 43

The Radial recurrent artery and the Radial nerve and its branches are seen deep in the groove between the central and lateral muscle groups



Brachialis
Biceps
Radial Nerve
Musculo-cutan N
Brachioradialis
Median N
Brachial V
Radial N
(deep br)
Brachial A
Radial recurrent a
Radial N
(superf br)

Fig 45—POSTEROLATERAL ASPECT OF THE ELBOW

The subcutaneous nerves which supply sensation to this region are branches of the Radial nerve These are the Lower lateral cutaneous nerve of the arm and the Posterior cutaneous nerve of the forearm

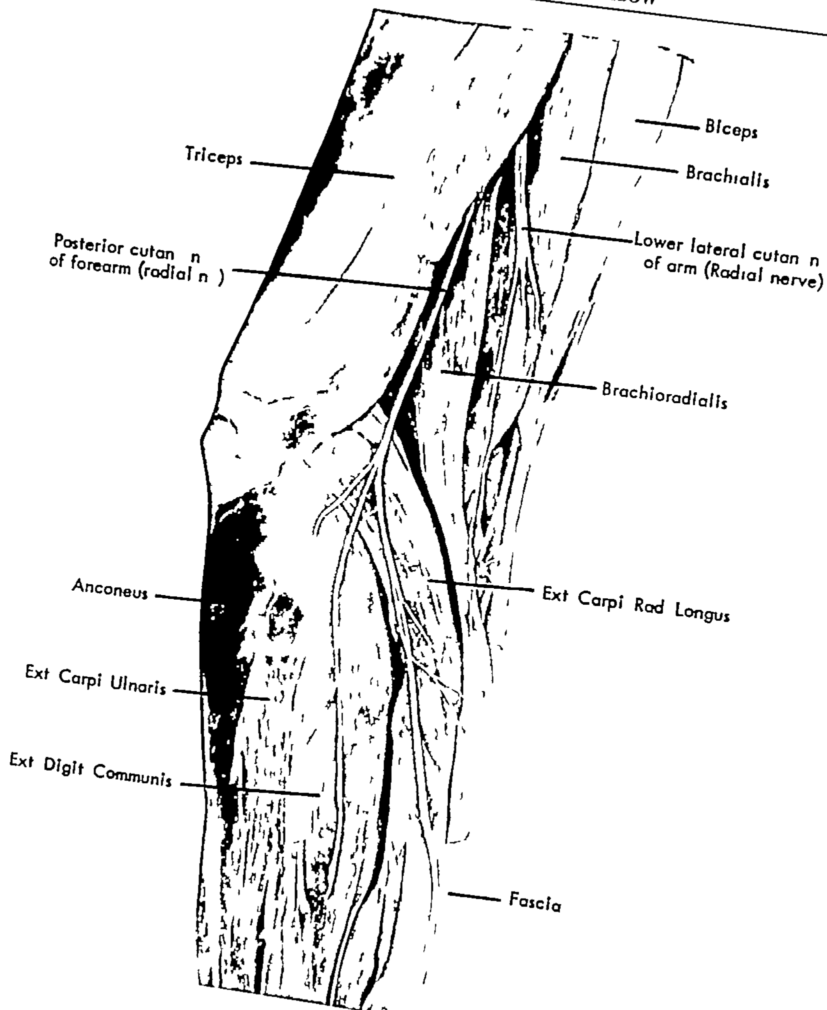
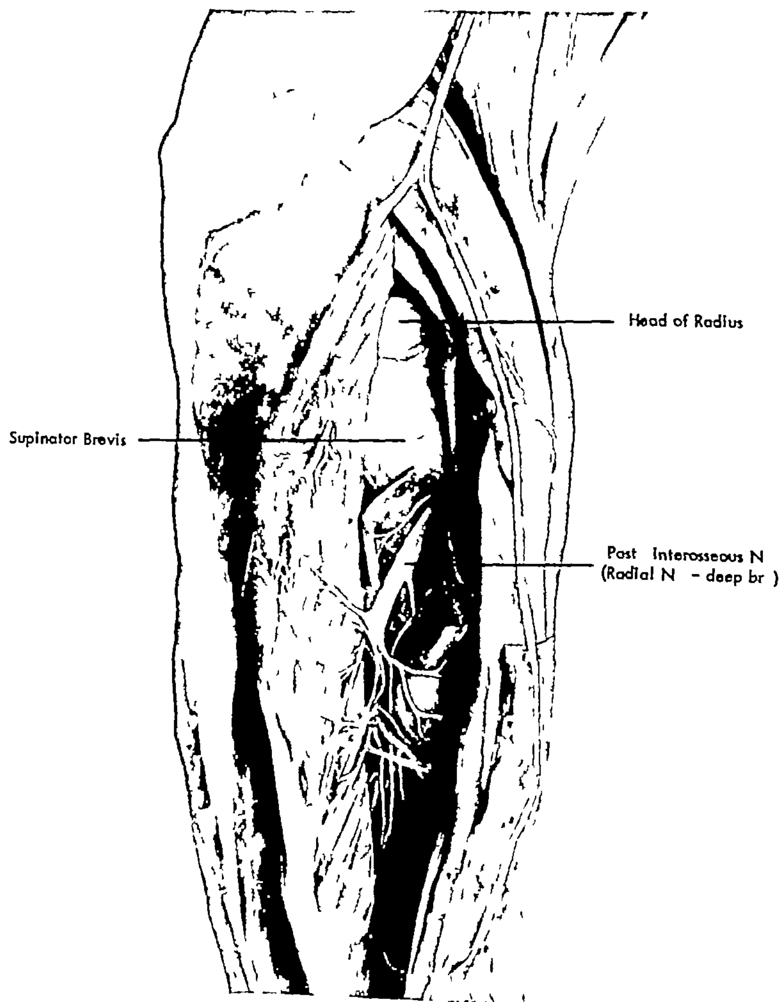

Biceps
Brachialis
Triceps
Lower lateral cutan n
of arm (Radial nerve)
Posterior cutan n
of forearm (radial n)
Brachioradialis
Anconeus
Ext Carpi Rad Longus
Ext Carpi Ulnaris
Ext Digit Communis
Fascia

Fig. 46

The muscle belly of the Extensor digitorum communis has been separated from the Extensor carpi radialis longus and brevis muscles

The deep plane of the Supinator brevis covers the posterolateral aspect of the elbow joint. The deep branch of the Radial nerve (Posterior interosseous nerve) passes from the anterolateral aspect of the elbow to the posterior aspect of the forearm between the two planes of muscle fibers of the Supinator brevis This nerve gives muscular branches to the dorsal muscles of the forearm and terminal articular branches to the radio-carpal and intercarpal joints (See Figs 77 and 97 pages 115 and 146)


Head of Radius
Supinator Brevis
Post Interosseous N
(Radial N - deep br)

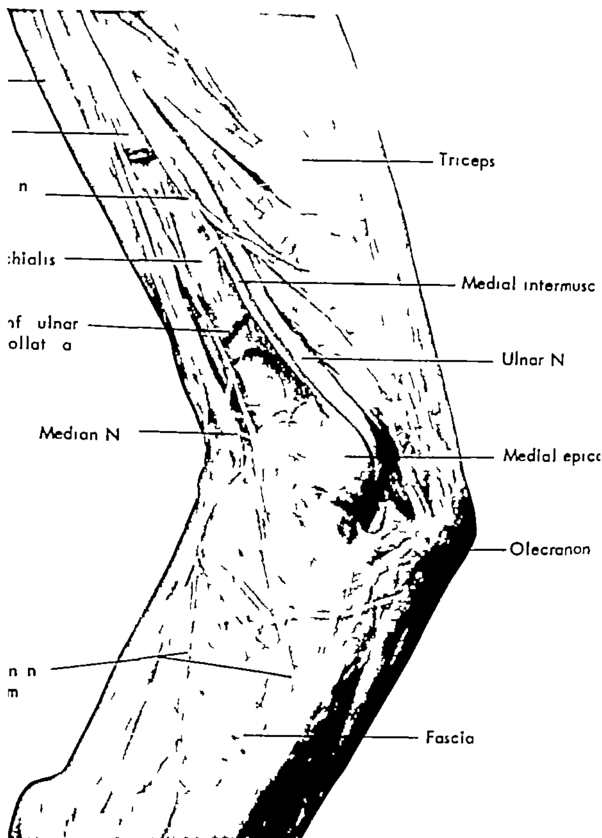


Fig. 47—MEDIAL ASPECT OF THE ELBOW

The Ulnar nerve descends behind the medial intermuscular septum ınd in front of the medial head of the Triceps and at the elbow the nerve ies between the medial epicondyle of the humerus and the oleocranon The Ulnar nerve enters the forearm between the humeral and ulnar ıeads of the Flexor carpi ulnaris muscle

APPROACHES TO THE ELBOW JOINT REGION

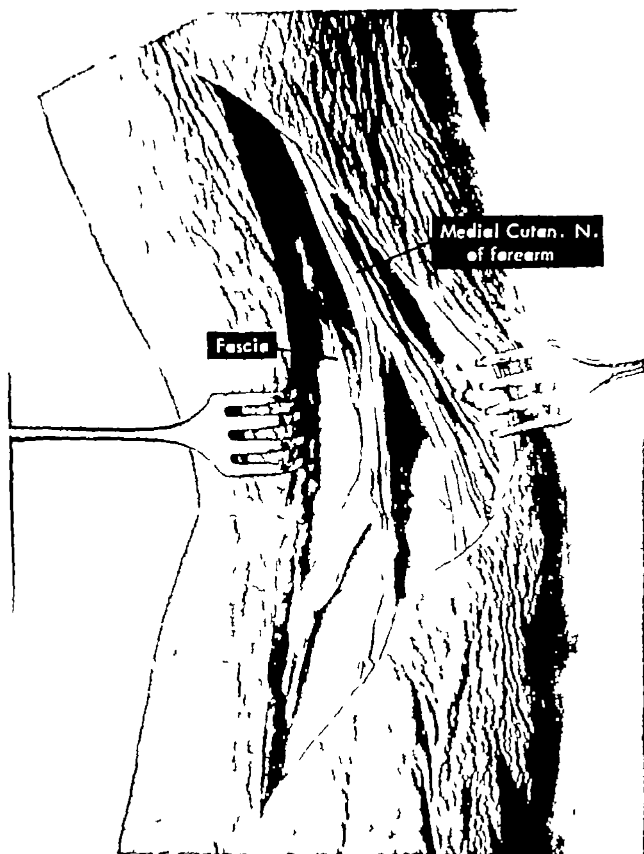


THE ELBOW JOINT REGION—ANTEROMEDIAL APPROACH

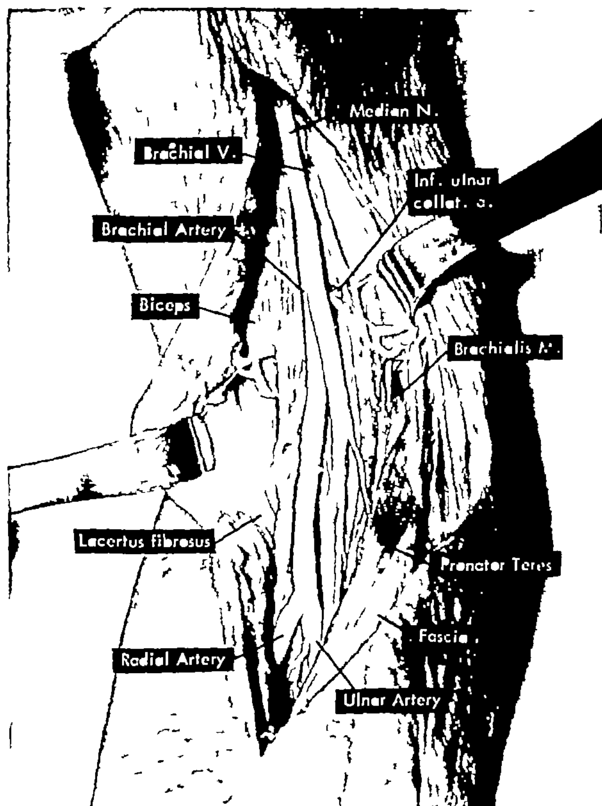
I—The skin incision begins medial to the Biceps crosses obliquely the flexion crease of the elbow and extends distally over the forearm (Fig 48)



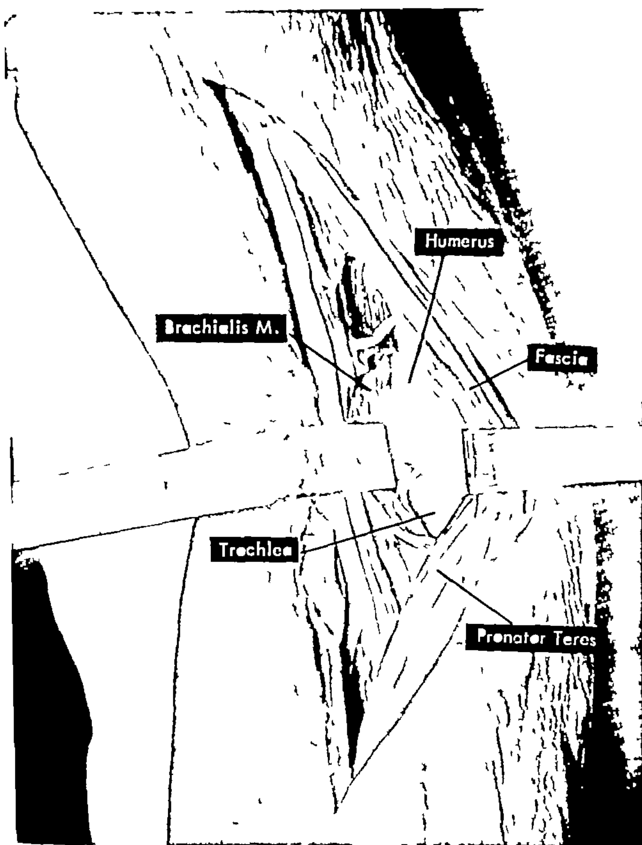
Fig 49—ANTEROPOSTERIOR ROENTGENOGRAM OF THE RIGHT ELBOW



II—The Medial cutaneous nerve of the forearm is found in the subcutaneous tissue in intimate relationship with the Basilic vein (Fig. 50)



III—The fascia is incised longitudinally. Observe the relationship between the Brachial artery and veins and the median nerve (Fig. 51)



IV—The Brachialis muscle is retracted laterally with the Median nerve and the Brachial artery and veins
The Pronator teres is retracted medially
The lower and medial portion of the humerus is exposed
The capsule of the elbow joint is opened and the trochlea can be seen
(Fig 52)



THE ELBOW JOINT REGION—ANTEROLATERAL APPROACH

1—The arm will be extended and the forearm supinated The incision is made along the distal portion of the lateral bicipital groove and extends downwards along the anterior border of the Brachioradialis muscle. At the level of the elbow the incision curves laterally avoiding to cut across the flexion crease (Fig. 53)

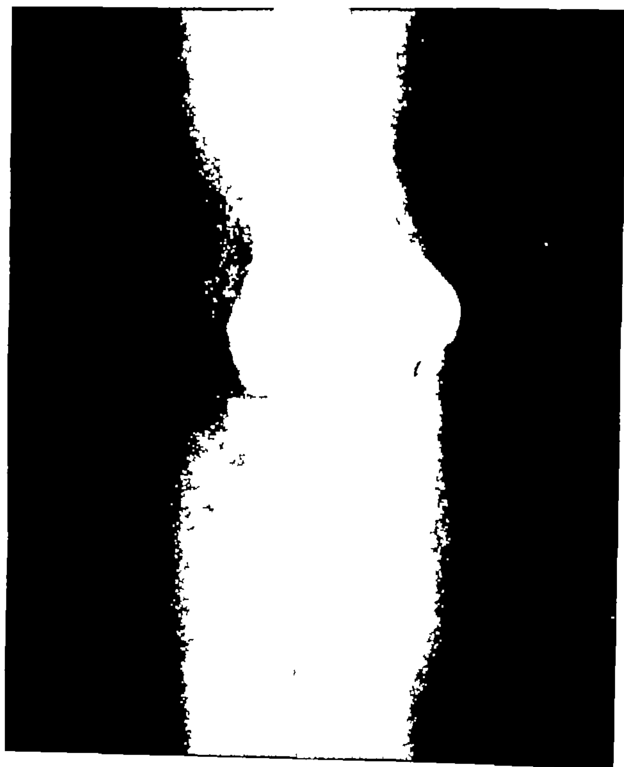
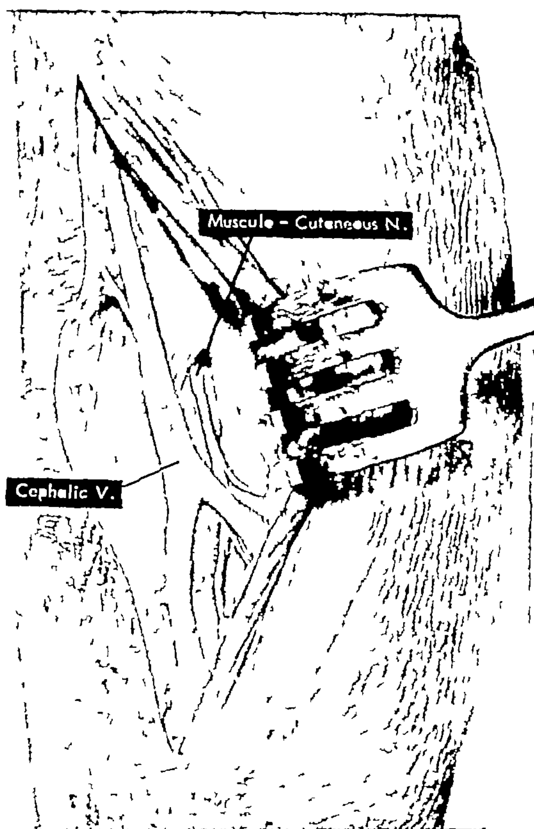
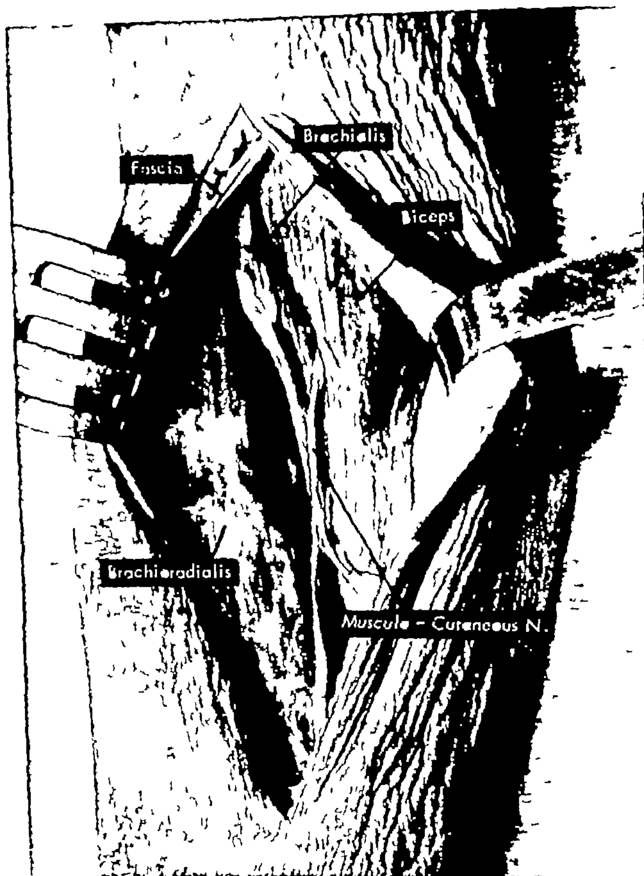


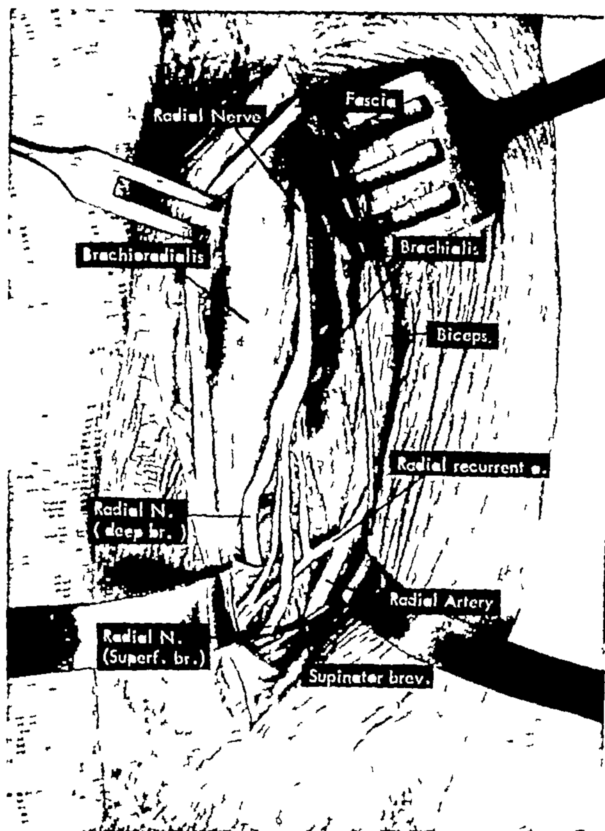
Fig 54—ANTEROPOSTERIOR ROENTGENOGRAM OF THE RIGHT ELBOW



I—The Cephalic vein is found in the subcutaneous fat. After piercing the fascia the Musculo-cutaneous nerve is in close relationship with this vein (Fig 55)



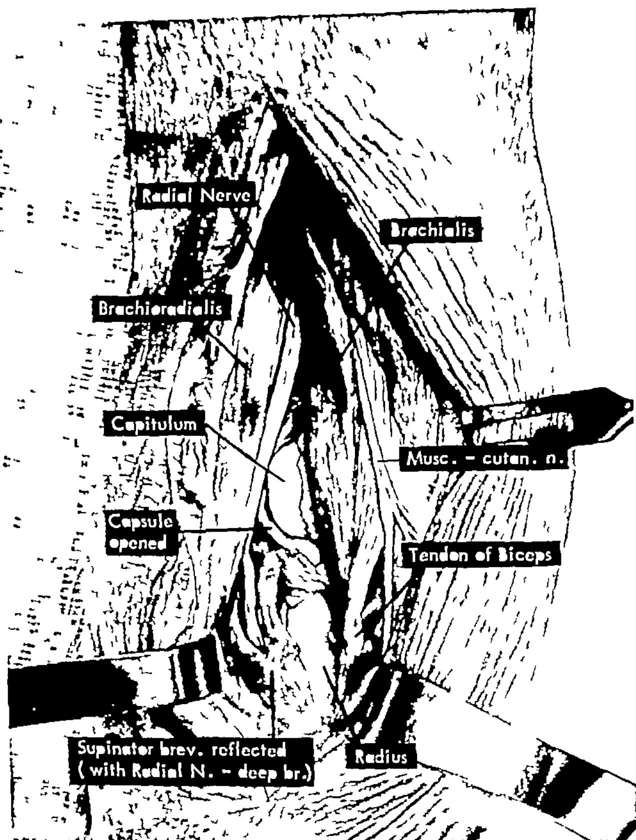
III—*The fascia has been incised. The cleavage plane between the Brachioradialis and the Biceps and Brachialis muscles can be seen* (Fig 56)



[illegible]—The Radial nerve and Radial recurrent artery are found by retracting the Brachioradialis muscle laterally and the Biceps and *Brachialis* medially.

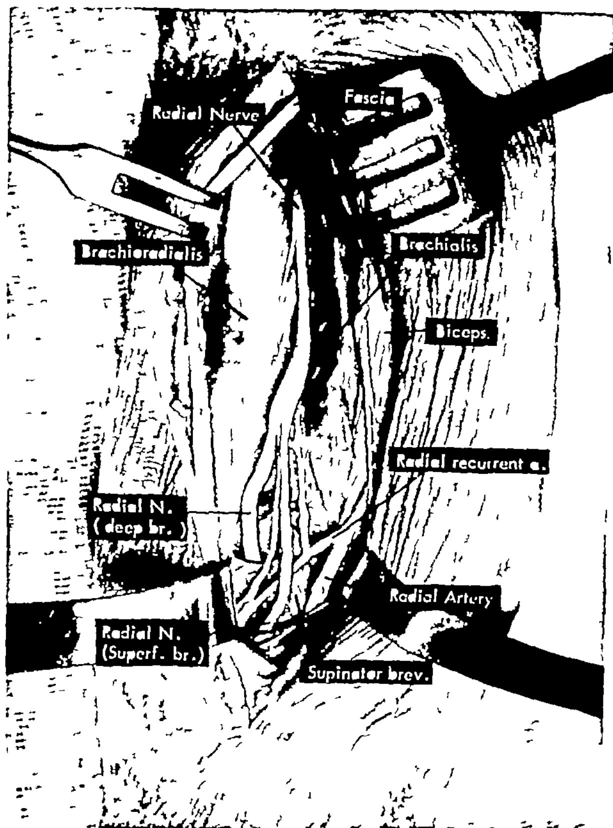
Observe the deep branch of the Radial nerve entering the Supinator brevis muscle after supplying the Brachioradialis and giving a long branch to the Extensor carpi radialis longus.

The superficial branch of the Radial nerve runs along the forearm with the Radial artery (Fig. 57)



V—The Radial recurrent artery has been ligated. After subperiosteal dis section the Supinator brevis muscle with the deep branch of the Radial nerve has been retracted laterally exposing the upper third of the radius

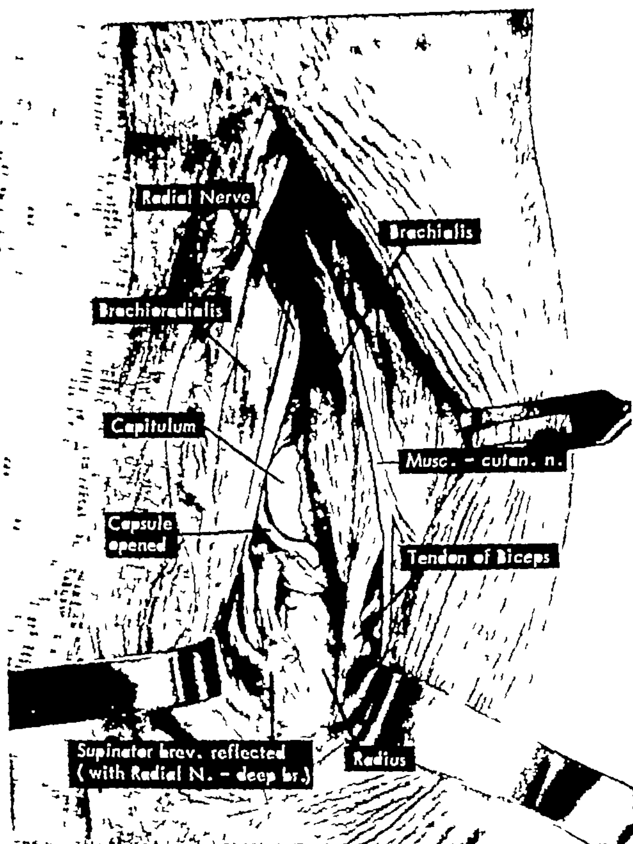
The anterolateral aspect of the joint capsule has been cut longitudinally and the capitulum and the head of the radius are visible (Fig 58)



VI–The Radial nerve and Radial recurrent artery are found by retracting the Brachioradialis muscle laterally and the Biceps and Brachialis medially

Observe the deep branch of the Radial nerve entering the Supinator brevis muscle after supplying the Brachioradialis and giving a long branch to the Extensor carpi radialis longus

The superficial branch of the Radial nerve runs along the forearm with the Radial artery (Fig. 57)



\—The Radial recurrent artery has been ligated After subperiosteal dissection the Supinator brevis muscle with the deep branch of the Radial nerve has been retracted laterally exposing the upper third of the radius

The anterolateral aspect of the joint capsule has been cut longitudinally and the capitulum and the head of the radius are visible (Fig. 58)



THE ELBOW JOINT REGION—LATERAL APPROACH

1—The lateral epicondyle and the olecranon are the important landmarks. The skin incision begins over the lateral supracondylar ridge of the distal third of the humerus extends downwards behind the lateral epicondyle over the head of the radius and along the cleavage between the Anconeus and Common extensor tendon (Fig 59)

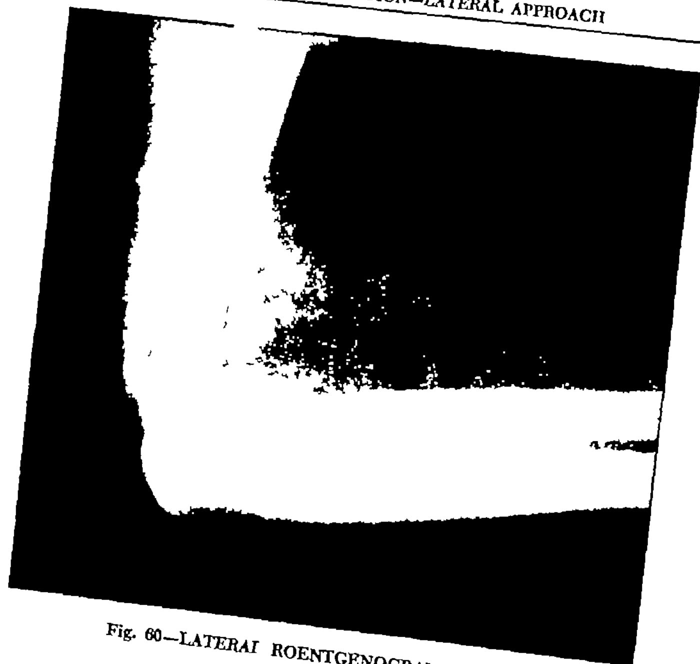
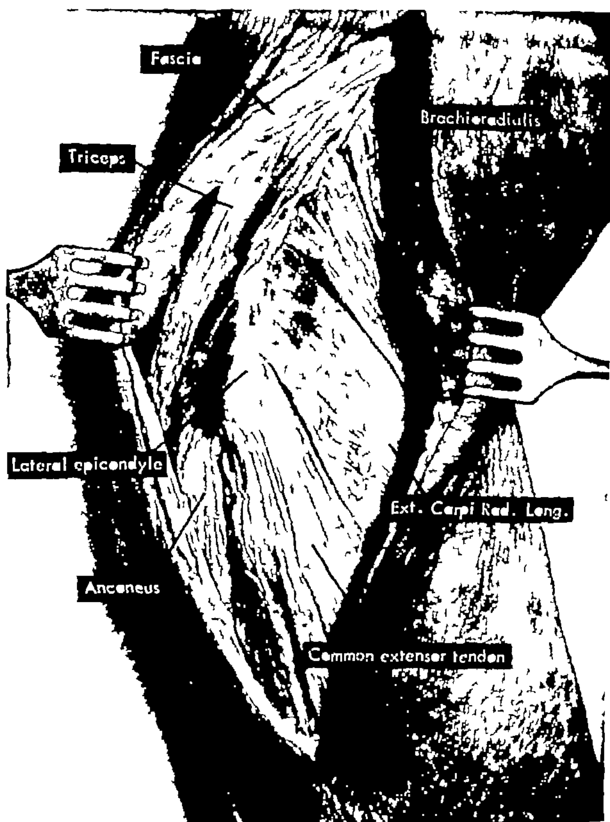
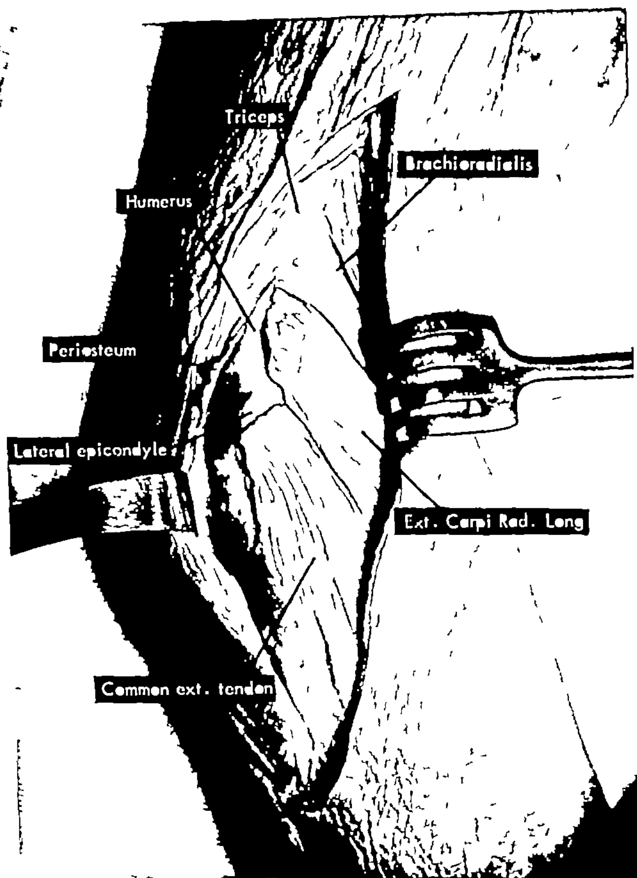


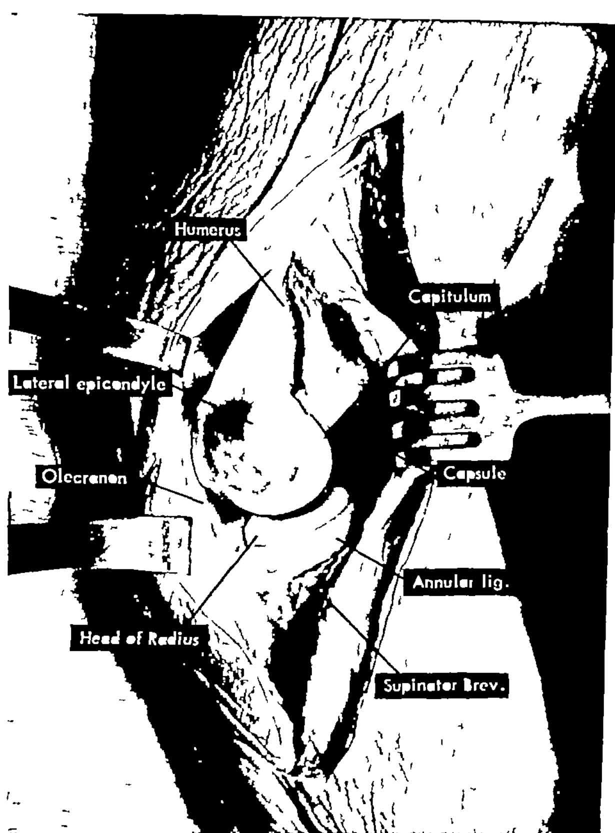
Fig. 60—LATERAL ROENTGENOGRAM OF THE RIGHT ELBOW



II—The skin and fascia have been incised and widely retracted to show the muscles of the posterolateral aspect of the elbow joint (Fig 61)



III—The periosteum has been incised along the lateral supracondylar ridge The Brachioradialis the Extensor carpi radialis longus and the Common extensor tendon have been partially disinserted The Anconeus has been disinserted from the lateral epicondyle and retracted (Fig 62)



IV—After subperiosteal dissection the muscles and periosteum were retracted from the lower end of the humerus The insertions of the capsule and lateral ligaments of the elbow joint were detached and retracted forward. A wide exposure of the lower end of the humerus and of the elbow joint was obtained.

Obviously a small segment of this incision will be sufficient if only the head of the radius and the capitulum are to be exposed (Fig. 63)



THE ELBOW JOINT REGION—MEDIAL APPROACH

I—A slightly curved skin incision which passes between the medial epicon dyle and the olecranon (Fig 64)

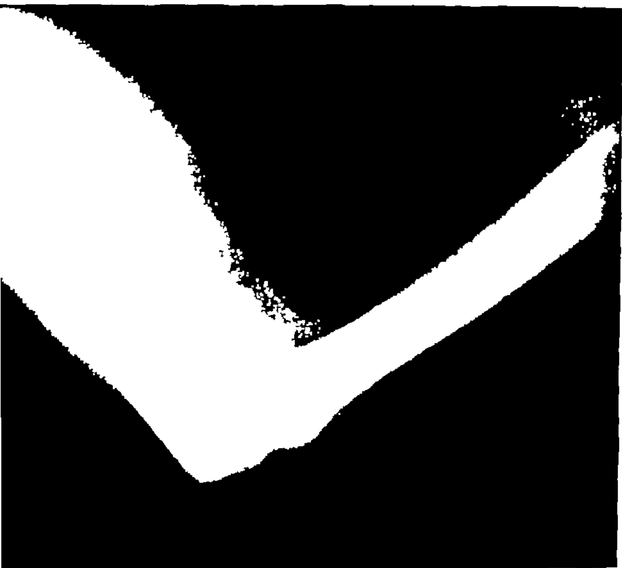
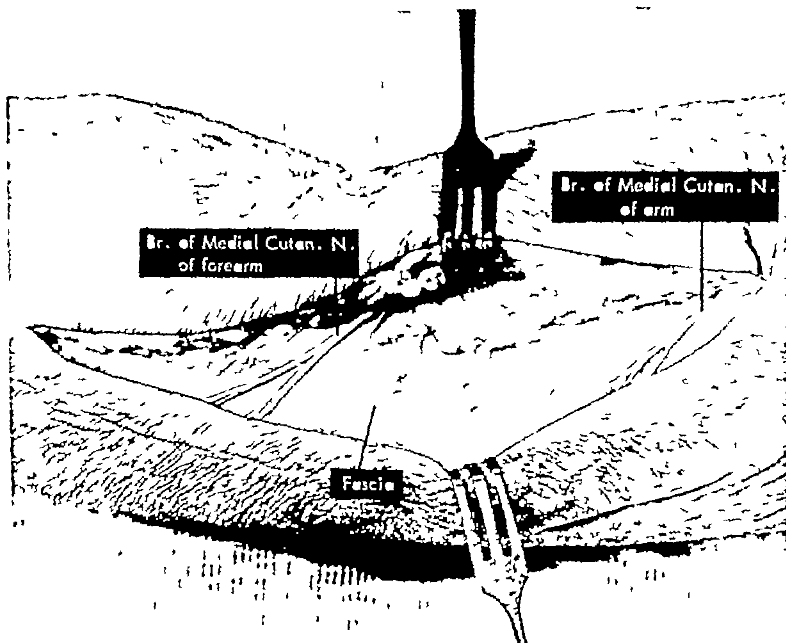
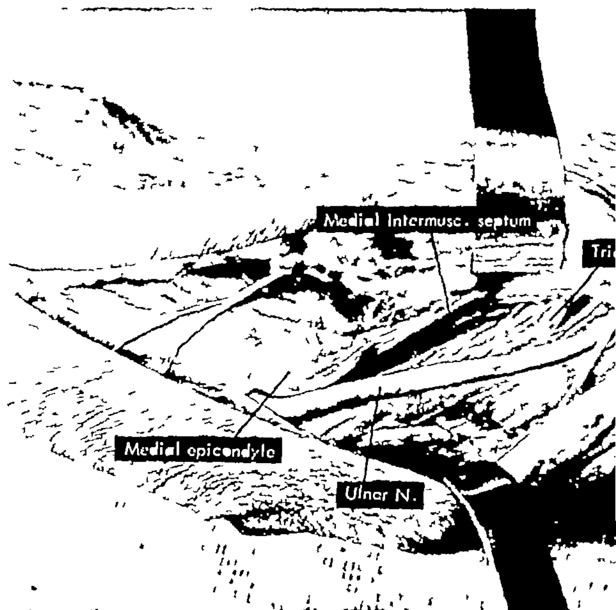


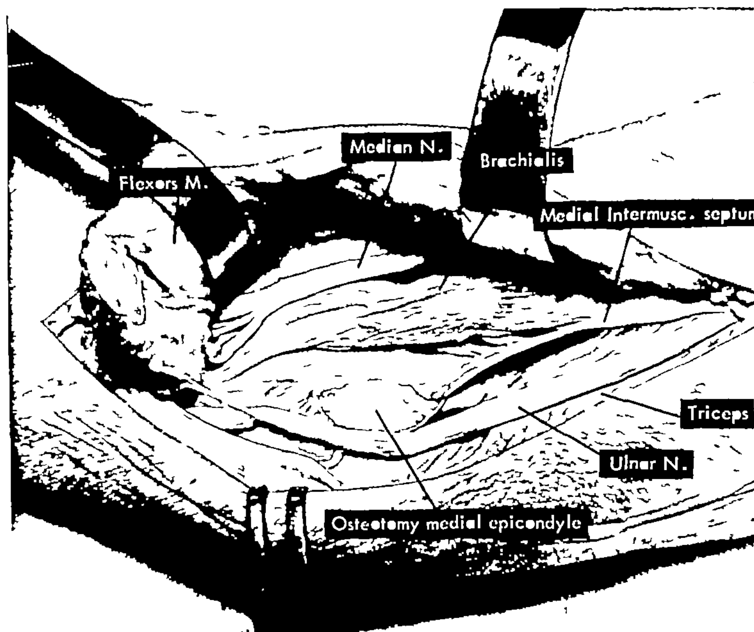
Fig. 65—MEDIAL ROENTGENOGRAM OF THE RIGHT ELBOW



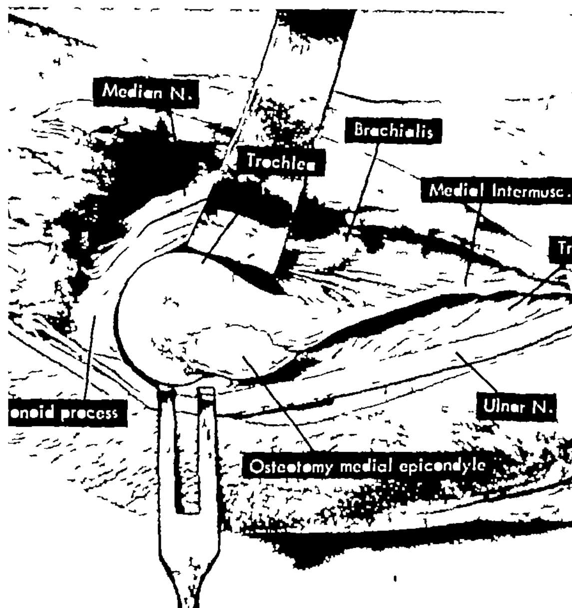
II—Branches of the Medial cutaneous nerve of the forearm and of the Medial cutaneous nerve of the arm are found in the subcutaneous fat (Fig 66)



III—The *fascia* is incised longitudinally and the Ulnar nerve is found descending between the medial head of the Triceps and the medial intermuscular septum. This nerve is isolated (Fig 67)



IV–The medial epicondyle is osteotomized and reflected downwards and forwards with its attached muscles



When the capsule is opened the trochlea and the coronoid process are seen The Brachialis and the capsule can be reflected subperiosteally for a wider exposure (Fig 69)



THE ELBOW JOINT REGION—POSTERIOR APPROACH

1—The important landmarks are the tip of the olecranon and the medial and lateral epicondyles
A slightly curved skin incision is made over the posterior and distal third of the arm extending down to the lateral aspect of the olecranon (Fig 70)

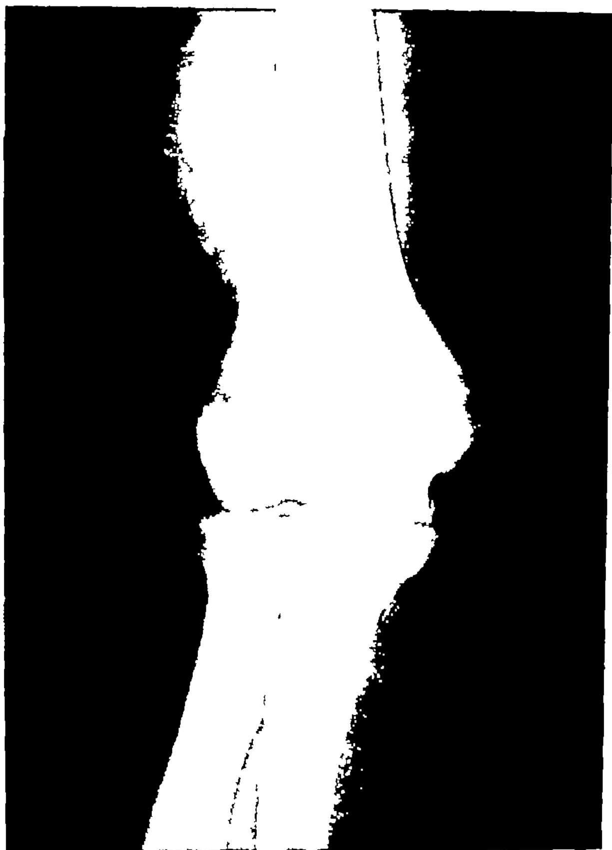
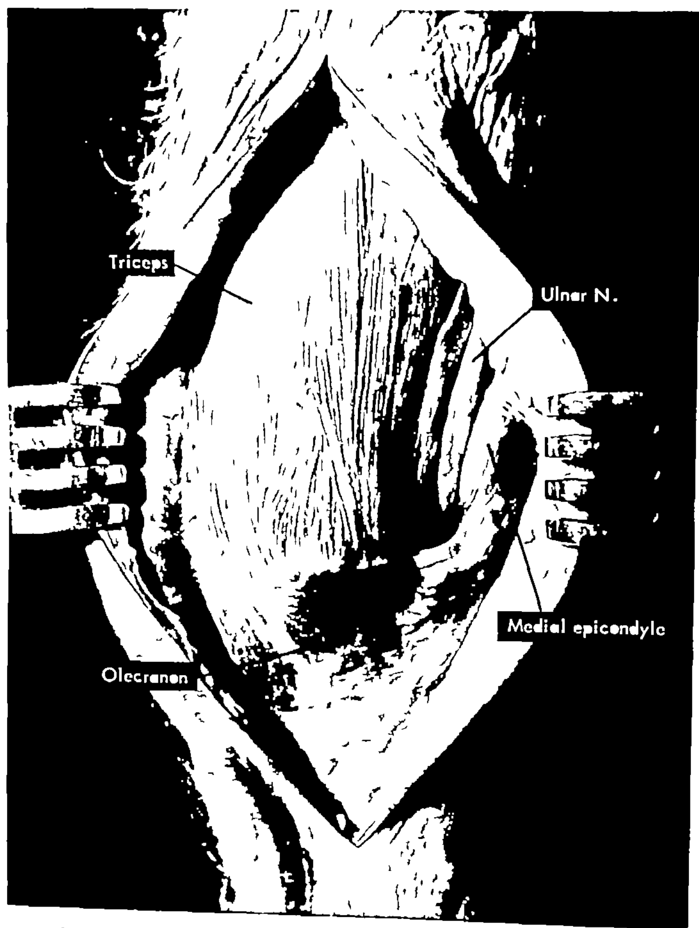
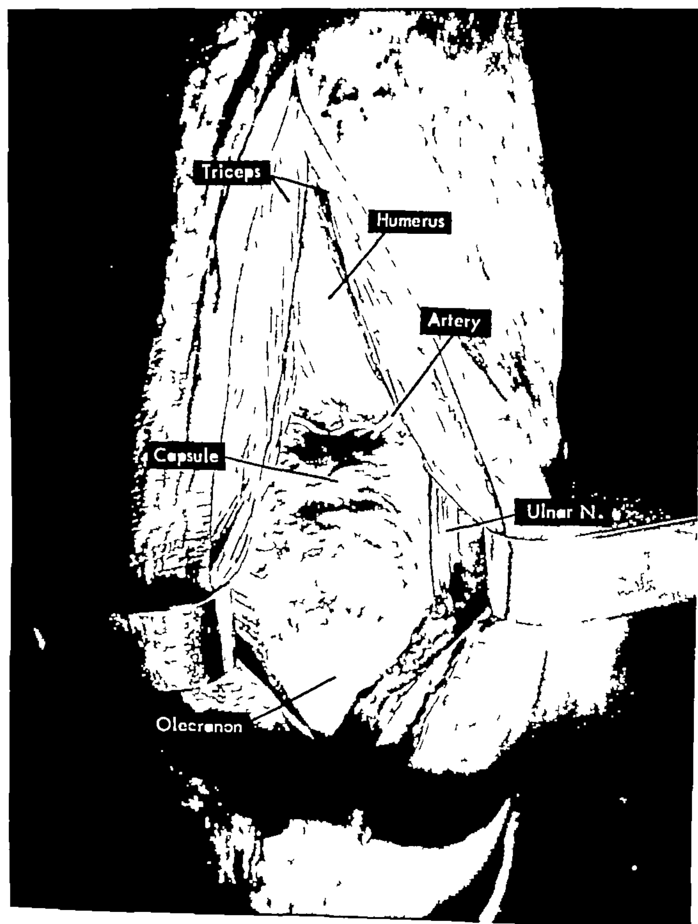


Fig. 71—POSTEROANTERIOR ROENTGENOGRAM OF THE LEFT ELBOW



II—The Triceps tendon and the olecranon are exposed. Observe the Ulnar nerve (Fig 72)

III—The Triceps tendon has been incised in the midline half is retracted medially and the other half laterally The lower posterior aspect of the humerus and the capsule of the elbow joint are exposed
The posterior aspect of the elbow joint can be more completely exposed by removing the Flexor carpi ulnaris medially and the Anconeus laterally from their insertions in the olecranon and dorsal border of the ulna
Observe the Ulnar nerve and branches of the periarticular arterial circle around the elbow joint (Fig 73)


Triceps
Humerus
Artery
Capsule
Ulnar N.
Olecranon

ANATOMY OF THE FOREARM

Fig 74—ANTERIOR ASPECT OF THE FOREARM (Left)

Observe

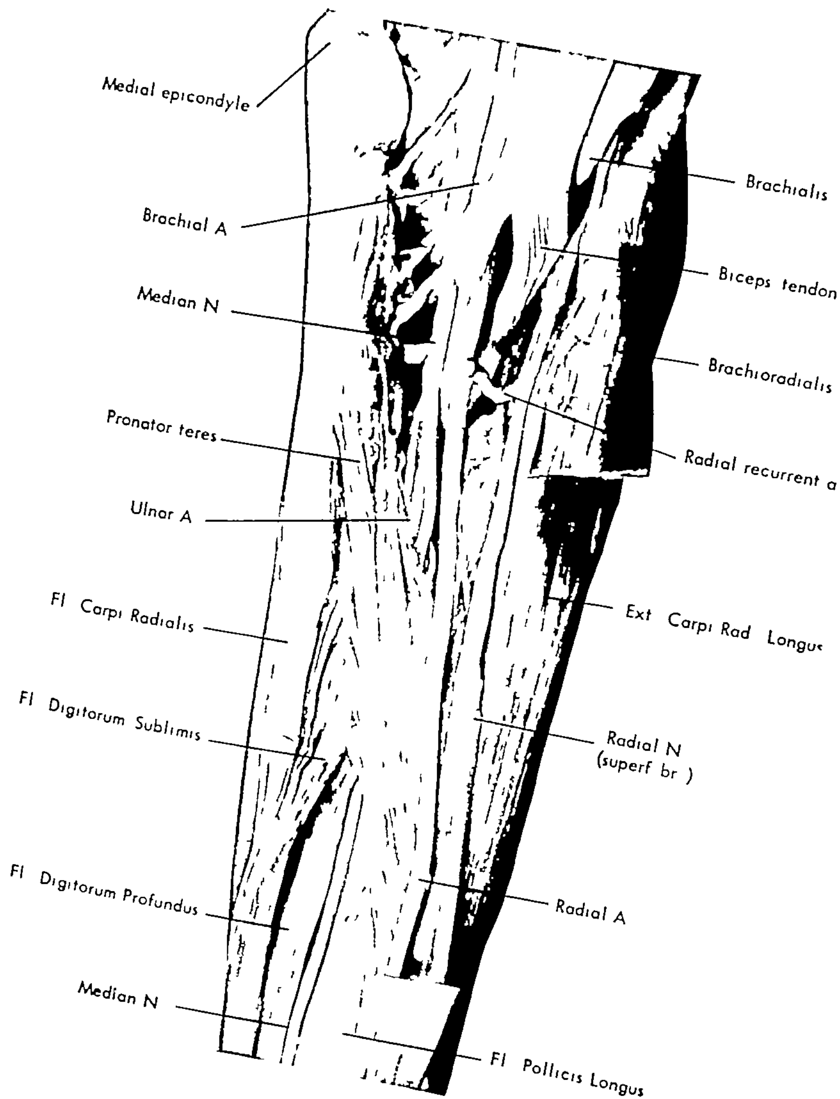
a—The Brachial artery lies between the Median nerve and the tendon of the Biceps Both artery and nerve are behind the bicipital aponeurosis (lacertus fibrosus)

b—The Median nerve pierces between the two heads of the Pronator teres muscle and is found in the middle portion of the forearm between the superficial and deep muscles in the interval formed by the Flexor pollicis longus and Flexor digitorum profundus

c—In the upper third of the forearm the Median nerve is separated from the Ulnar artery by the ulnar head of the Pronator teres muscle.

d—The motor branches leave the Median nerve from its medial side.

e—The superficial branch of the Radial nerve accompanies the Radial artery in the middle third of the forearm and then passes backwards underneath the tendon of the Brachioradialis. On the lateral surface of the distal third of the forearm the nerve perforates the deep fascia and becomes subcutaneous



Medial epicondyle
Brachial A
Median N
Pronator teres
Ulnar A
Fl Carpi Radialis
Fl Digitorum Sublimis
Fl Digitorum Profundus
Median N
Brachialis
Biceps tendon
Brachioradialis
Radial recurrent a
Ext Carpi Rad Longus
Radial N
(superf br)
Radial A
Fl Pollicis Longus

Fig. 75—ANTEROMEDIAL ASPECT OF THE FOREARM

The Flexor carpi ulnaris is retracted.

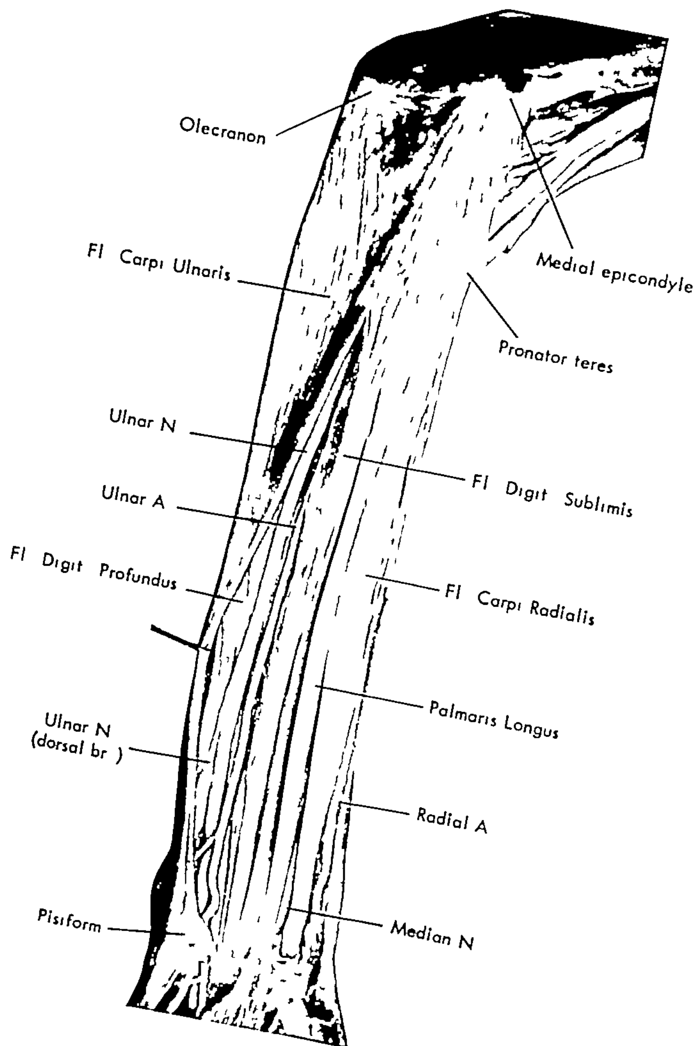
Observe

a—The Ulnar artery runs obliquely from its origin downward and medially, deep to the Pronator teres and Flexor digitorum sublimis muscles to join the Ulnar nerve

b—The Ulnar nerve and artery descend vertically near the medial border of the Flexor digitorum sublimis muscle and lie in front of the Flexor digitorum profundus and at the wrist in front of the transverse carpal ligament (flexor retinaculum)

c—At the wrist the Median nerve lies deep between the Flexor carpi radialis and the Palmaris longus tendons

d—The Radial artery lies laterally to the Flexor carpi radialis



Olecranon
Medial epicondyle
Fl Carpi Ulnaris
Pronator teres
Ulnar N
Fl Digit Sublimis
Ulnar A
Fl Digit Profundus
Fl Carpi Radialis
Palmaris Longus
Ulnar N
(dorsal br)
Radial A
Pisiform
Median N

Fig. 76—POSTERIOR ASPECT OF THE FOREARM

Observe the superficial muscles the superficial branch of the Radial nerve and the Posterior cutaneous nerve of the forearm (branch of the Radial nerve)

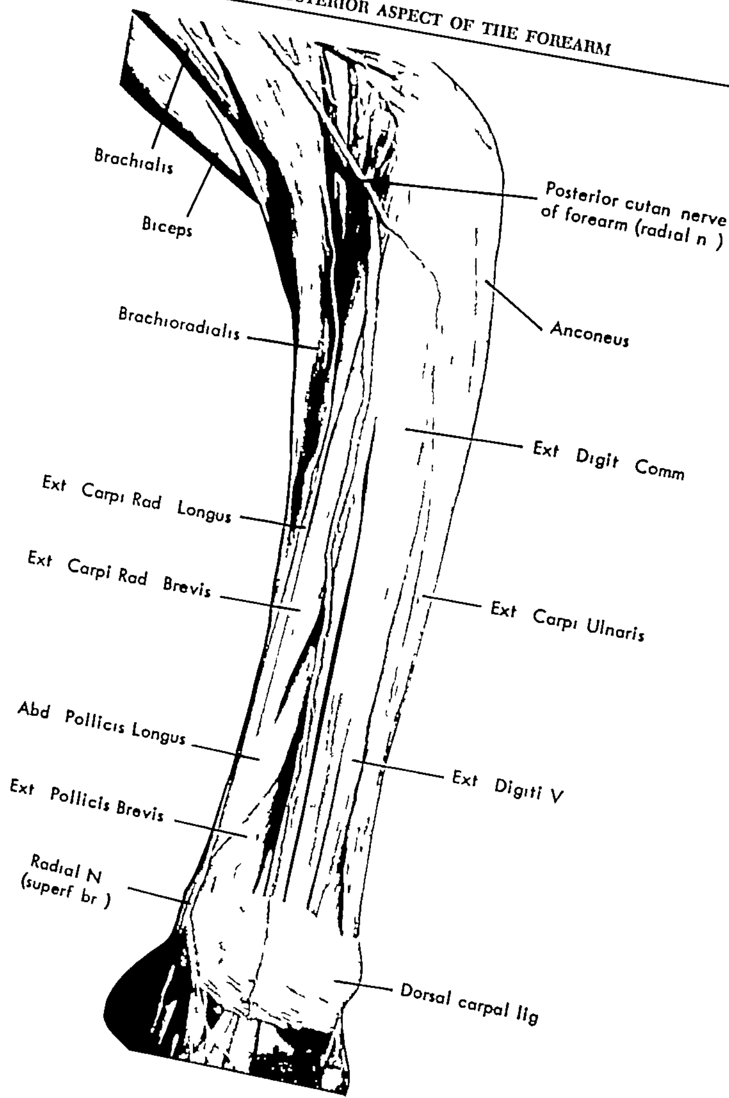
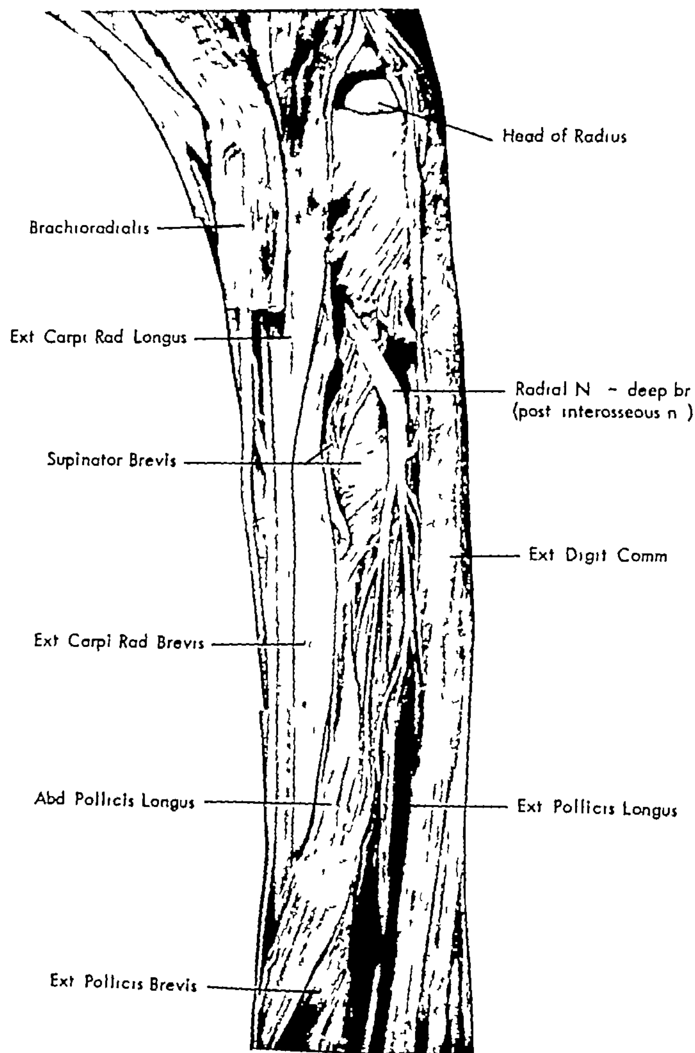

Brachialis
Biceps
Brachioradialis
Ext Carpi Rad Longus
Ext Carpi Rad Brevis
Abd Pollicis Longus
Ext Pollicis Brevis
Radial N (superf br)
Posterior cutan nerve of forearm (radial n)
Anconeus
Ext Digit Comm
Ext Carpi Ulnaris
Ext Digiti V
Dorsal carpal lig

Fig. 77—POSTERIOR ASPECT OF THE FOREARM

The muscle belly of the Extensor digitorum communis has been separated from the Extensor carpi radialis longus and brevis muscles

The deep branch of the Radial nerve (Posterior interosseous nerve) passes fom the anterolateral aspect of the elbow to the posterior aspect of the forearm between the two planes of muscle fibers of the Supinator brevis This nerve gives muscular branches to the dorsal muscles of the forearm (the Anconeus excepted) and terminal articular branches to the radio-carpal and intercarpal joints (See Figs 46 and 97 pages 75 and 146)

Observe the distance between the Posterior interosseous nerve and the head of the radius



Head of Radius
Brachioradialis
Ext Carpi Rad Longus
Radial N - deep br
(post interosseous n)
Supinator Brevis
Ext Digit Comm
Ext Carpi Rad Brevis
Abd Pollicis Longus
Ext Pollicis Longus
Ext Pollicis Brevis

Fig. 78—POSTEROMEDIAL ASPECT OF THE FOREARM

Observe

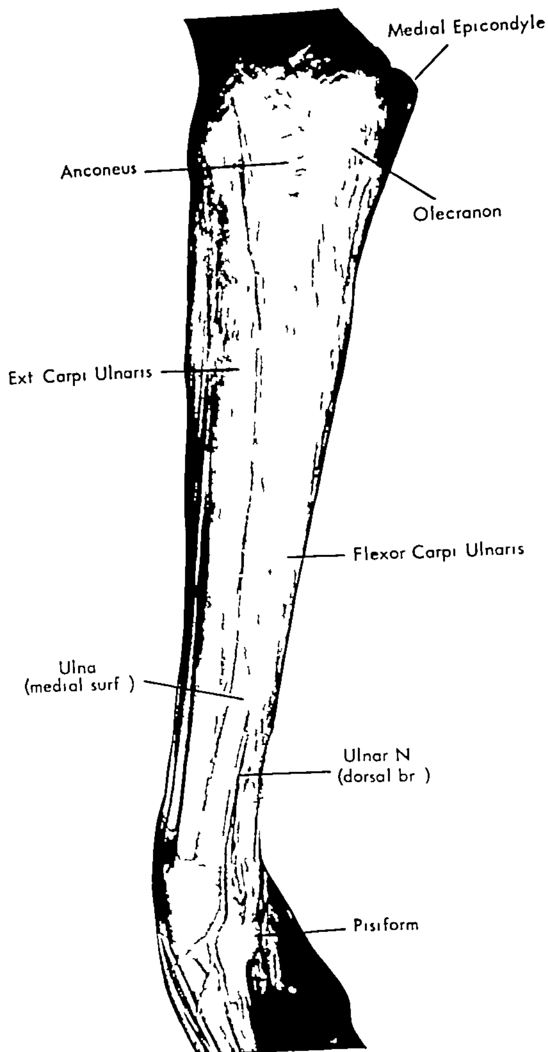
a—The posterior triangular surface of the olecranon.

b—The posterior border of the ulna is a sharp subcutaneous ridge easily felt on the posteromedial aspect of the forearm

c—The medial surface of the ulna is subcutaneous

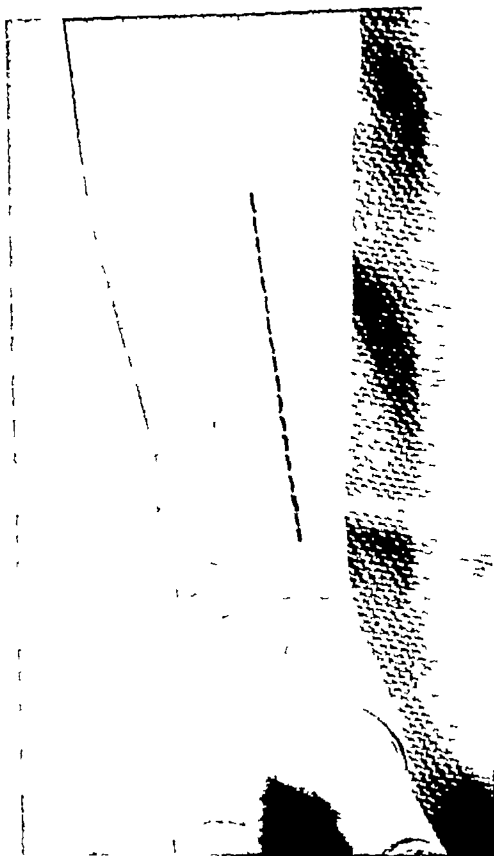
d—The dorsal branch of the Ulnar nerve

e—The olecranon and the posterior border and medial surface of the ulna can be easily approached through a longitudinal incision



Medial Epicondyle
Anconeus
Olecranon
Ext Carpi Ulnaris
Flexor Carpi Ulnaris
Ulna
(medial surf)
Ulnar N
(dorsal br)
Pisiform

APPROACHES TO THE FOREARM

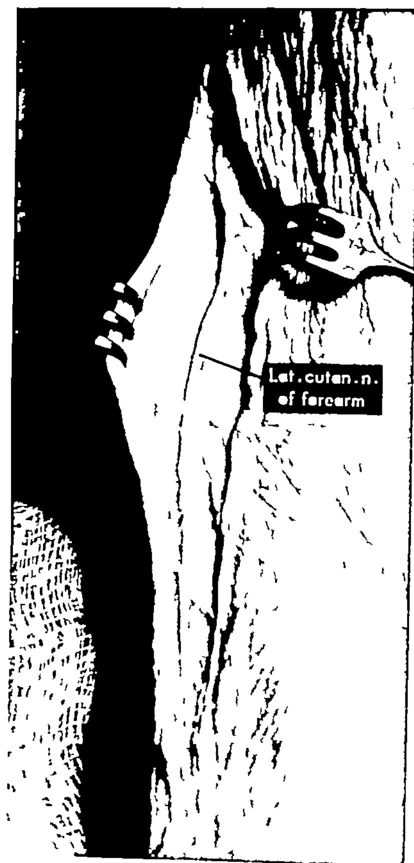


ANTEROLATERAL APPROACH TO THE MIDDLE AND DISTAL THIRD OF THE RADIUS

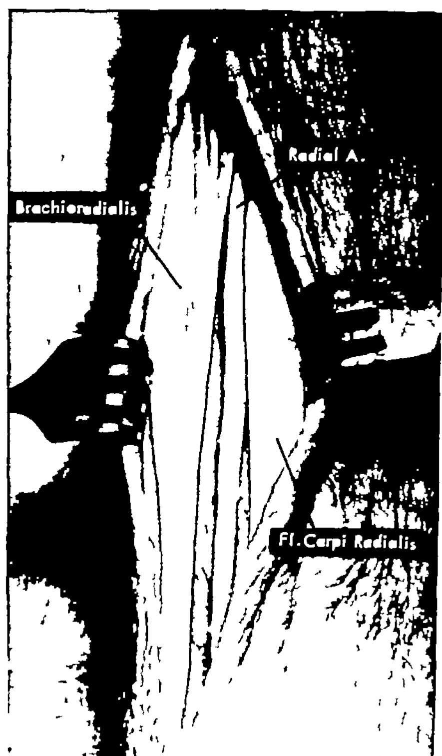
I—Skin incision along the anterior margin of the Brachioradialis muscle (Fig 79)



Fig. 80—OBLIQUE ROENTGENOGRAM OF THE
RIGHT FOREARM



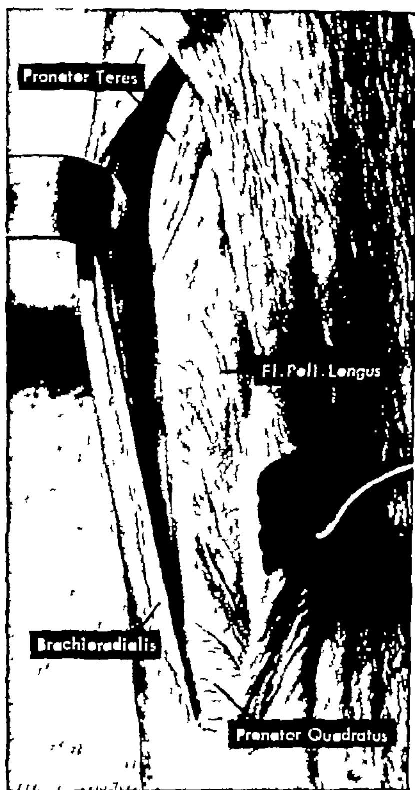
II—Observe in the subcutaneous fat a branch of the Lateral cutaneous nerve of the forearm (Fig 81)



III—The fascia is incised longitudinally Observe the Radial artery running deep in the interval between the Brachioradialis and Flexor carpi radialis muscles (Fig 82)



IV–The Brachioradialis is retracted laterally Observe the Radial nerve (superficial branch) that passes backwards between the Brachioradialis and Extensor carpi radialis longus tendons (Fig 83)



V—The Flexor carpi radialis and the Radial artery are retracted medially the tendons of the Brachioradialis and Extensor carpi radialis longus are retracted laterally with the superficial branch of the Radial nerve. Observe the Pronator teres the Flexor pollicis longus and the Pronator quadratus covering the middle and distal third of the radius (Fig. 84)



VI—With the forearm in slight pronation, the periosteum is incised longi tudinally along its lateral aspect and the radius is exposed subperiosteally (Fig. 85)

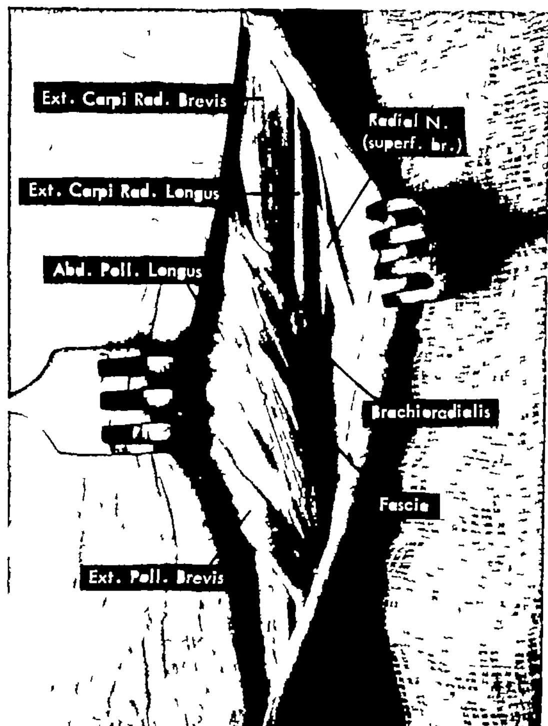


POSTERIOR APPROACH TO THE MIDDLE AND DISTAL PORTION OF THE RADIUS

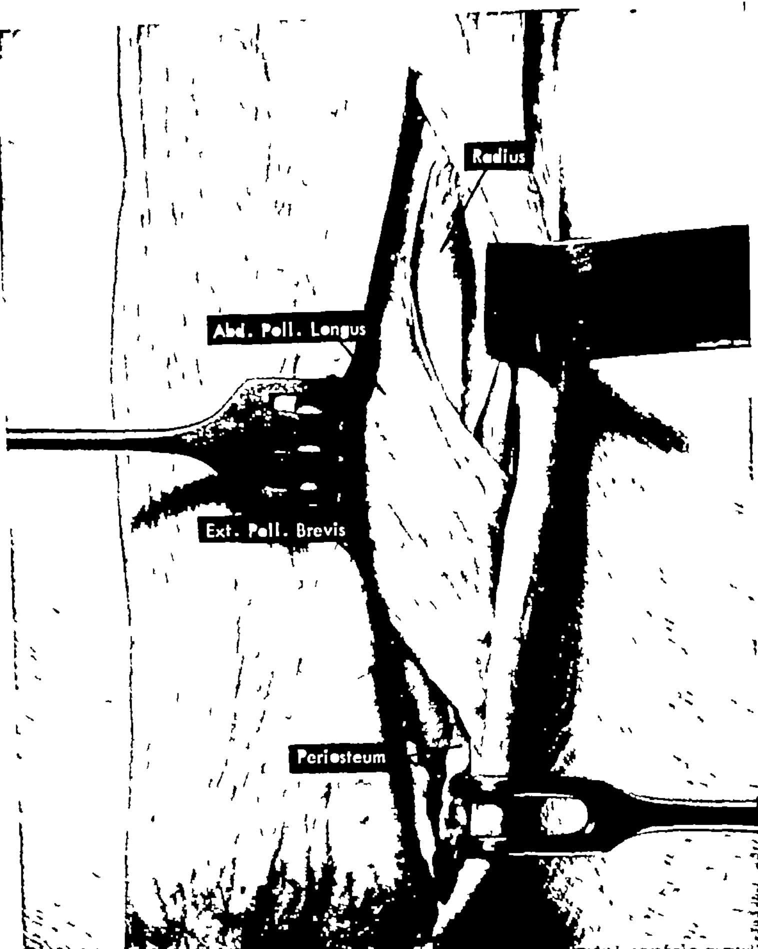
I—The forearm is in pronation The skin incision begins at the wrist and extends upward over the dorsal aspect of the radius (Fig. 86)



Fig. 87—POSTEROANTERIOR ROENTGENOGRAM OF THE RIGHT FOREARM AND WRIST



II—The deep fascia is incised longitudinally The Abductor pollicis longus and the Extensor pollicis brevis muscle bellies can be seen crossing obliquely over the Extensor carpi radialis longus and brevis tendons The Radial nerve (superficial branch) runs between the Brachioradialis and Extensor carpi radialis longus tendons and pierces the deep fascia of the forearm to become subcutaneous (Fig 88)



III–The Abductor pollicis longus and the Extensor pollicis brevis are isolated. The Extensor carpi radialis longus and brevis are retracted laterally The periosteum is incised along the midline of the posterior aspect of the radius (Fig 89)

ANATOMY OF THE WRIST AND HAND

Fig. 90—DISSECTION OF THE WRIST, PALM, AND DIGITS

The skin, the anterior fascia of the wrist, the palmar aponeurosis and the thenar and hypothenar fascia were removed

In the wrist, the Median nerve gives a palmar cutaneous twig and lies deep between the Flexor carpi radialis and the Palmaris longus tendons.

The distribution of the Median and Ulnar nerves in the palm and fingers and the anastomosis betwen both are demonstrated.

Numerous Paccini corpuscles are conspicuous

The Ulnar artery and the superficial palmar branch of the Radial artery form the Superficial palmar arch

Observe the fibrous flexors sheaths



ANTERIOR ASPECT OF THE WRIST

Fig. 91 The Median nerve lies medial to the Flexor carpi radialis tendon. In this specimen the Palmaris longus muscle was absent.

The tendons of the Flexor digitorum sublimis to the middle and ring fingers are medial to the Median nerve and on the same plane.

The Ulnar nerve and artery descend between the tendons of the Flexor carpi ulnaris and of the sublimis to the ring finger At the wrist the Ulnar nerve and artery pass in front of the transverse carpal ligament and usually are covered by an expansion of the Flexor carpi ulnaris tendon.

The Radial artery is lateral to the Flexor carpi radialis tendon.

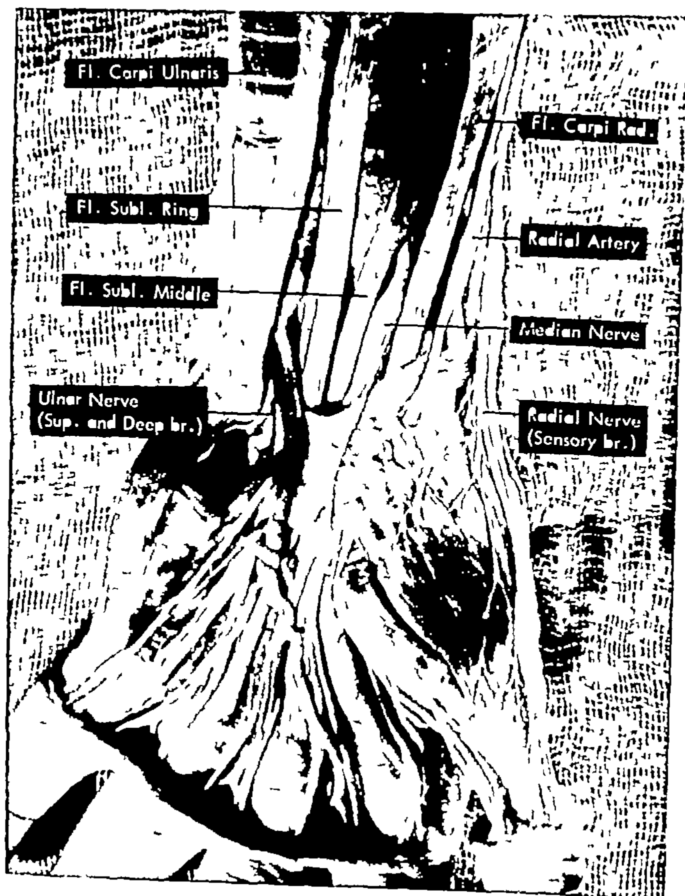

Fl. Carpi Ulnaris
Fl. Carpi Rad.
Fl. Subl. Ring
Radial Artery
Fl. Subl. Middle
Median Nerve
Ulnar Nerve
(Sup. and Deep br.)
Radial Nerve
(Sensory br.)

Fig. 92. A portion of the Flexor sublimis tendons to the middle and ring fingers were resected. Under them observe the Flexor sublimis tendons to the index and little fingers

The Median nerve lies in front of the flexor sublimis tendon to the index finger This tendon may have muscular fibres to the level of the carpal tunnel

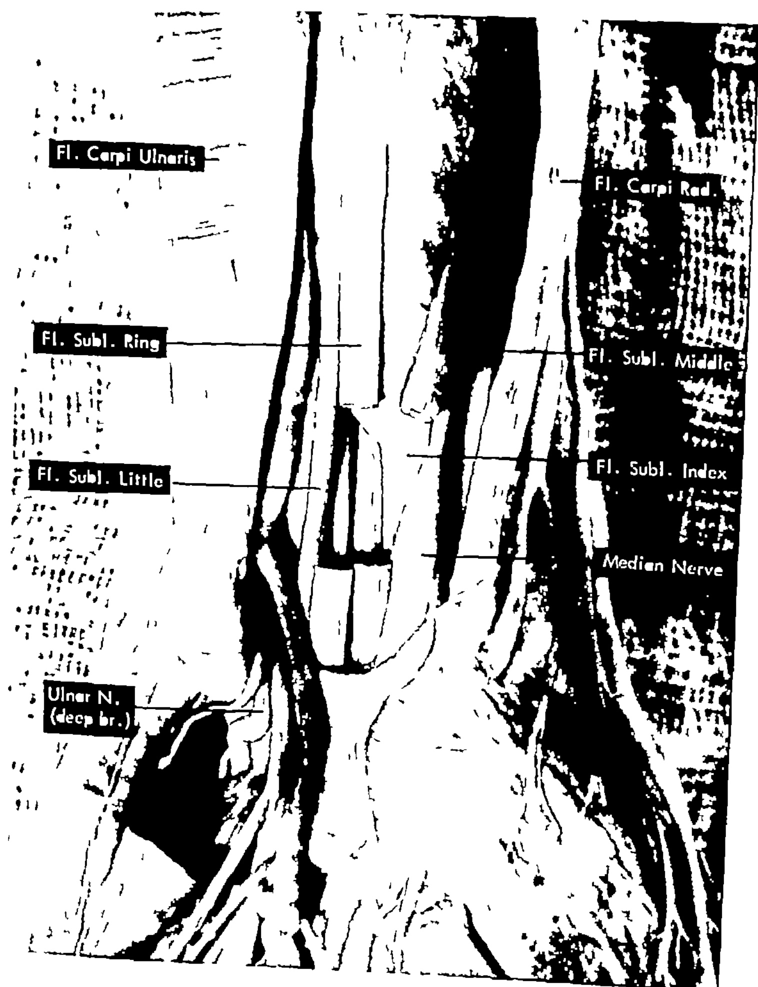
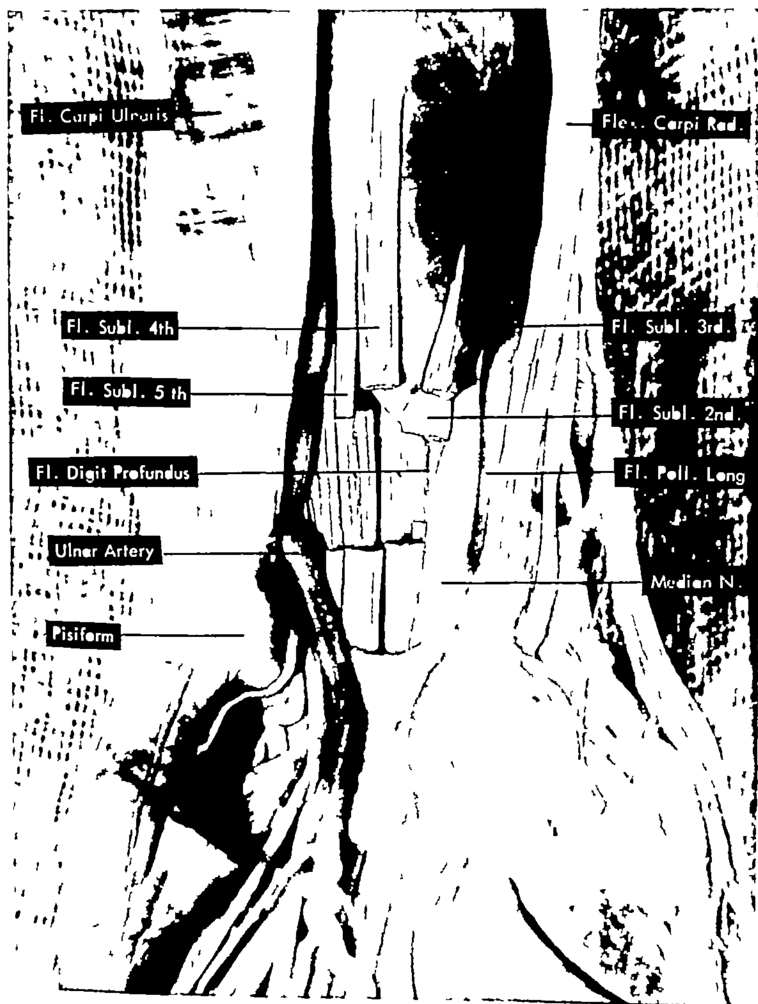

Fl. Carpi Ulnaris
Fl. Carpi Rad.
Fl. Subl. Ring
Fl. Subl. Middle
Fl. Subl. Little
Fl. Subl. Index
Median Nerve
Ulnar N.
(deep br.)

Fig 93 A portion of the Flexor sublimis tendons to the index and little fingers was also resected. In the deep plane the four tendons of the Flexor digitorum profundus are seen lying side by side. The Flexor pollicis longus tendon is underneath the Median nerve and the Flexor carpi radialis


Fl. Carpi Ulnaris
Carpi Rad.
Fl. Subl. 4th
Fl. Subl. 3rd.
Fl. Subl. 5 th
Fl. Subl. 2nd.
Fl. Digit Profundus
Fl. Poll. Long
Ulner Artery
Median N.
Pisiform

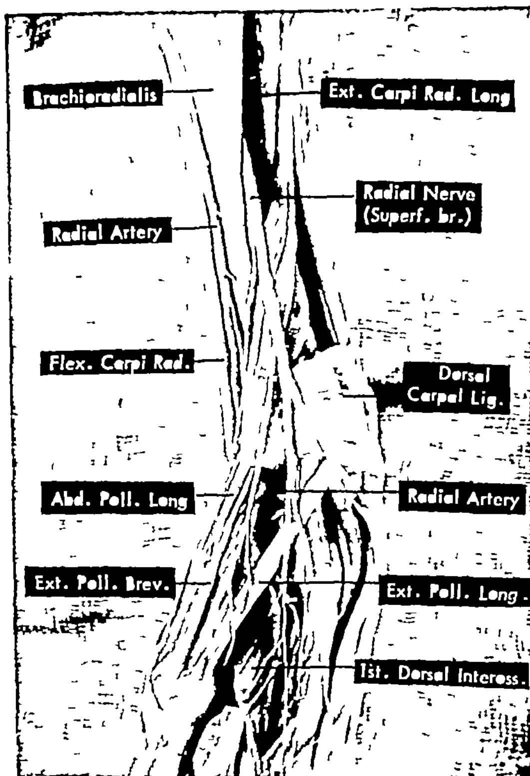


Fig. 95—THE RADIAL ASPECT OF THE WRIST

The Radial nerve (superficial branch) accompanies the Radial artery in the middle third of the forearm and then passes backwards under the tendon of the Brachioradialis On the lateral surface of the distal third of the forearm the nerve perforates the deep fascia and becomes subcutaneous

The tendons of the Abductor pollicis longus the Extensor pollicis brevis and the Extensor pollicis longus bound the anatomical snuff box. The Radial artery is on the floor of the snuff box.

Fig 96—ANTERIOR LIGAMENTS OF THE RADIO-CARPAL, CARPAL, AND CARPO-METACARPAL JOINTS

Observe the strong anterior radio-carpal ligaments (radio-lunate, radio-capitate) When the forearm supinates the hand follows the radius owing to these ligaments.

Observe the sacciform recess of the inferior radio-ulnar joint.

Observe the deep branch of the Ulnar nerve which crosses under the hook of the hamate and gives motor supply to the hypothenar muscles (except the Palmaris brevis which is supplied by the superficial branch of the Ulnar nerve) all the Interossei, the two medial Lumbricals the deep head of the Flexor pollicis brevis and the Adductor pollicis muscle.

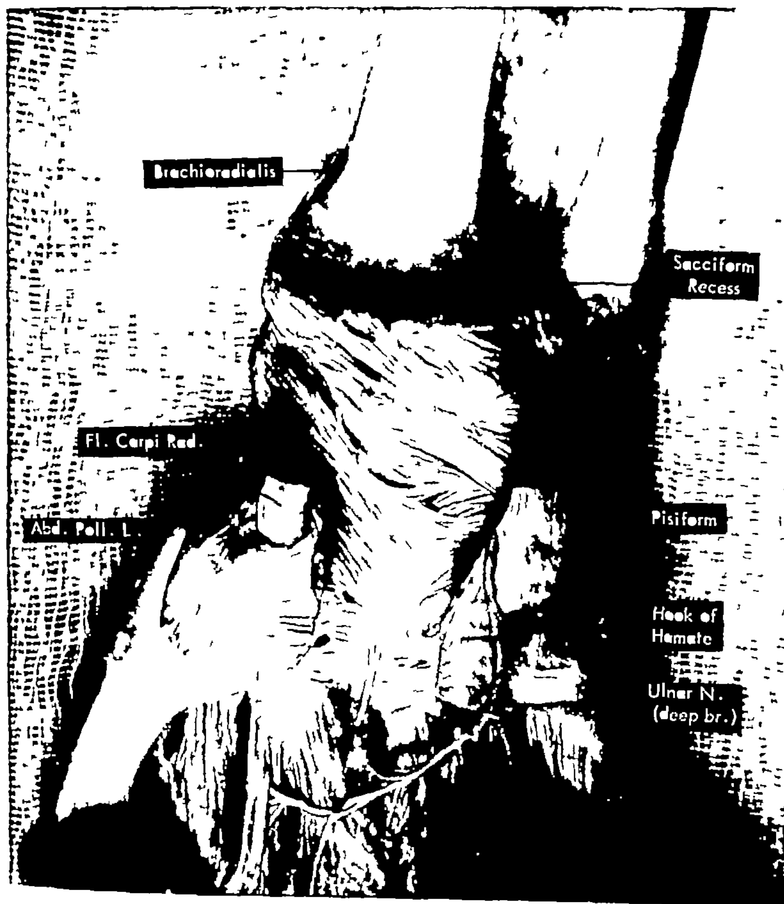

Brachioradialis
Sacciform Recess
Fl. Carpi Rad.
Pisiform
Abd. Poll. L.
Hook of Hamate
Ulnar N. (deep br.)

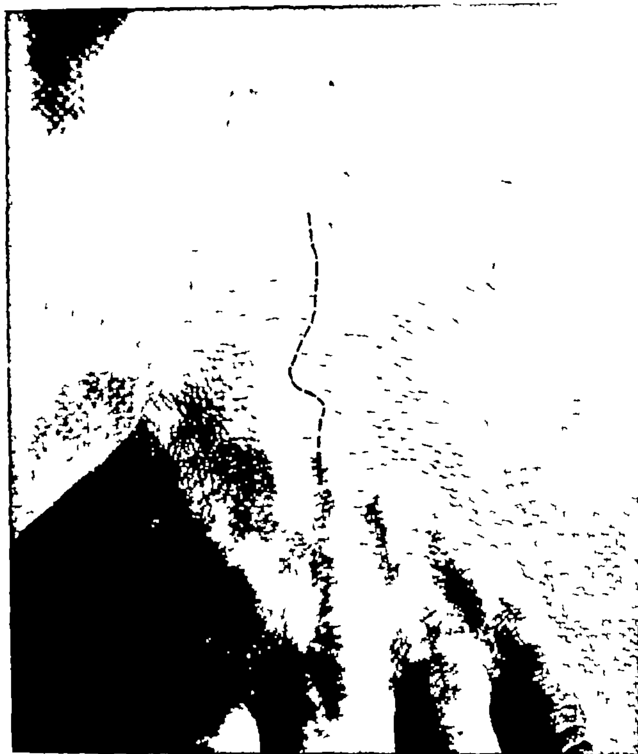


Fig. 97—DORSAL LIGAMENTS OF THE WRIST

When the forearm pronates the hand follows the radius owing to the strong dorsal radio-carpal ligaments

Observe the posterior interosseous branch of the Radial nerve, source of the sensory and trophic supply of the radio-carpal, intercarpal, and carpo-metacarpal joints

APPROACHES TO THE WRIST JOINT REGION



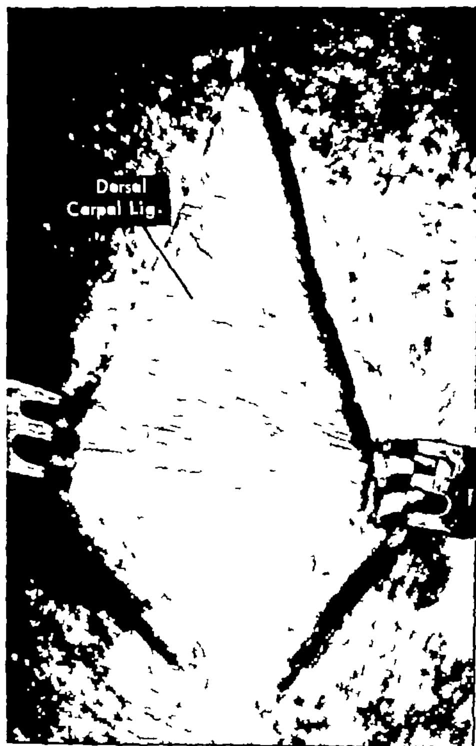
POSTERIOR APPROACH TO THE WRIST JOINT

I–The landmarks are the Extensor digitorum communis Extensor carpi radialis brevis and Extensor pollicis longus tendons The prominence of the dorsal radial tubercle (of Lister) on the lower end of the radius can be palpated

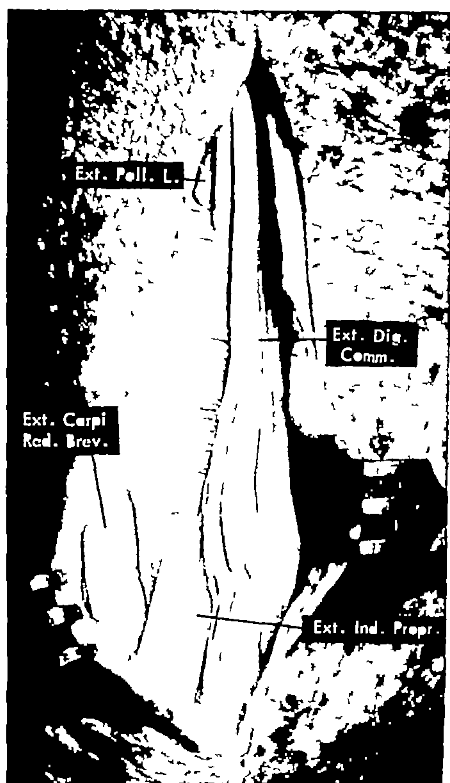
The incision is S shaped and extends to the shaft of the third meta carpal bone (Fig 98)



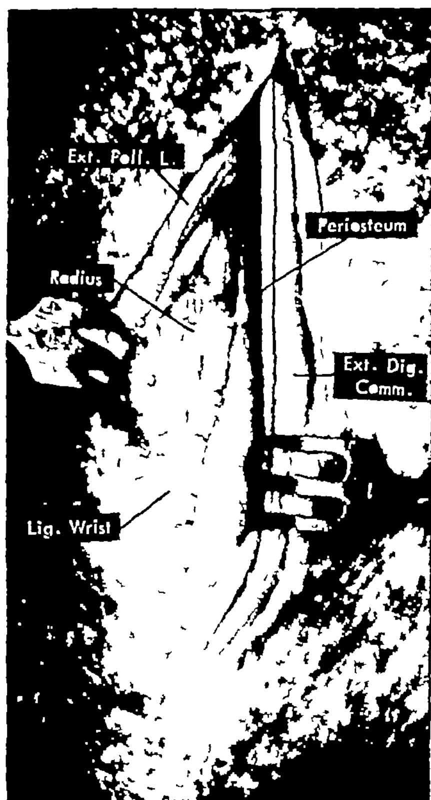
Fig. 99—POSTEROANTERIOR ROENTGENOGRAM OF THE LEFT WRIST



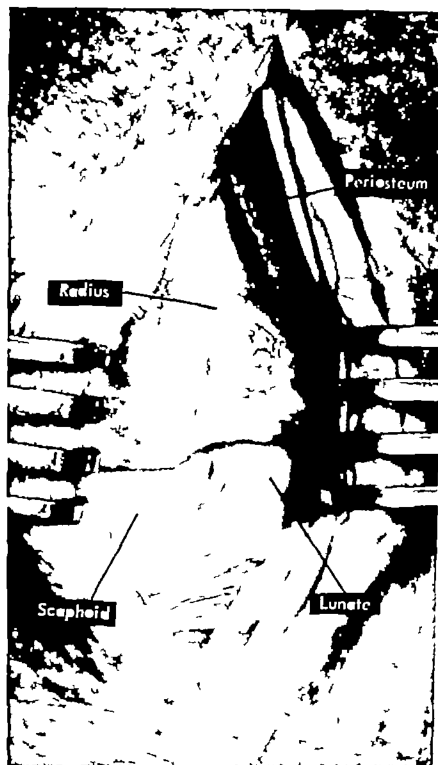
II—Observe the dorsal carpal ligament (Fig 100)



III—The dorsal carpal ligament is opened over the radial side of the Extensor digitorum communis tendon (Fig 101)



IV—The Extensor digitorum communis tendons are retracted to the ulnar side. The periosteum is incised longitudinally and stripped off medially. The periosteum is also reflected radially lifting with it the Extensor *pollicis longus* tendon from its groove (Fig. 102)



V—The dorsal aspect of the lower end of the radius is widely exposed. The joint capsule is opened (Fig 103)



APPROACH TO THE SCAPHOID

I–The anatomical snuff box is bound medially by the Extensor pollicis longus tendon and laterally by the Extensor pollicis brevis and Abductor *pollicis longus tendons* The *styloid* process of the radius can be palpated The incision is S shaped as outlined (Fig 104)



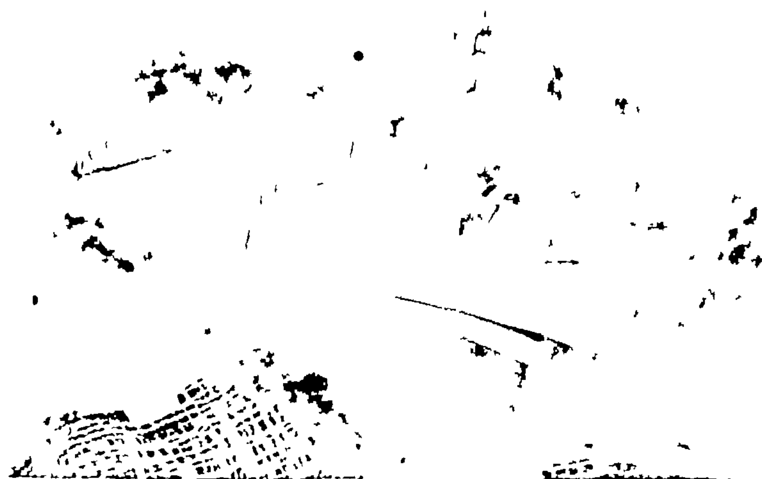
Fig. 105—OBLIQUE ROENTGENOGRAM OF THE LEFT WRIST



II–The sensory branch of the Radial nerve runs in the subcutaneous tissue Observe the tendons of the Extensor pollicis longus the Extensor pollicis brevis and the Abductor pollicis longus covered by the fascia (Fig 106)



–The fascia has been removed and the tendons of the Extensor pollicis longus the Extensor pollicis brevis, and the Abductor pollicis longus may be seen Observe also the Extensor carpi radialis longus tendon The Radial artery crosses the floor of the anatomical snuff box (Fig 107)



IV—The Dorsal carpal branch of the Radial artery was tied. The distal portion of the Dorsal carpal ligament was cut The wrist joint was opened by incising the capsule longitudinally (Fig 108)



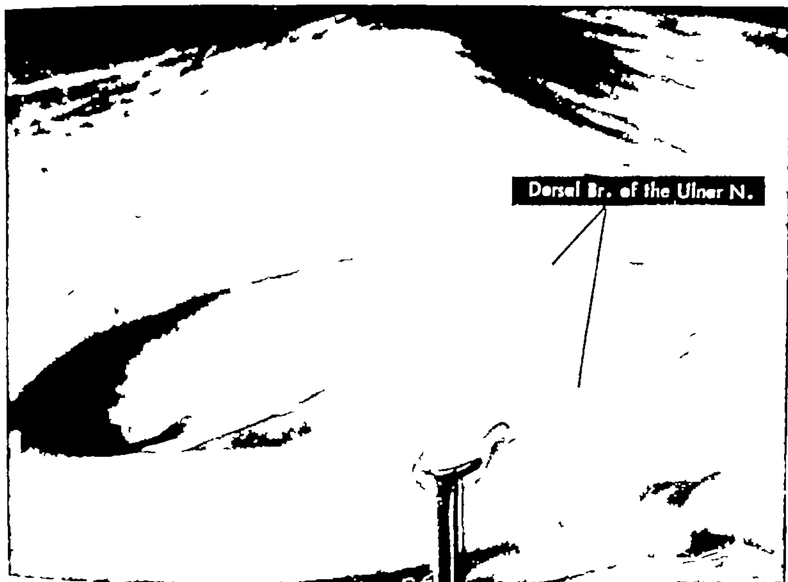
V—Osteotomy of the styloid process of the radius The scaphoid is well exposed (Fig 109)



RESECTION OF THE DISTAL EPIPHYSIS OF THE ULNA
I—Observe the head of the ulna and the S shaped incision (Fig 110)



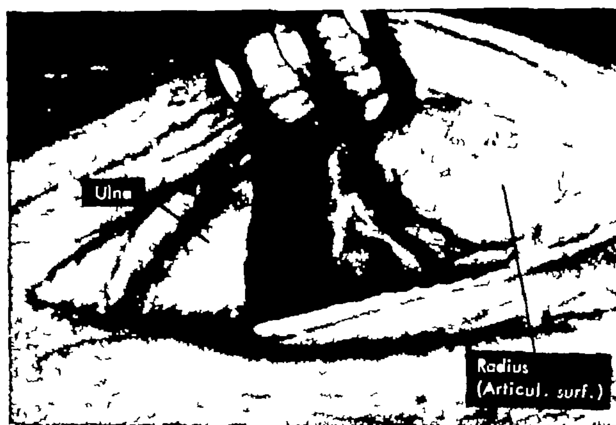
Fig. 111—LATERAL ROENTGENOGRAM OF THE RIGHT WRIST



II—Observe the dorsal branch of the Ulnar nerve in the subcutaneous fat (Fig. 112)



III—The fascia and the dorsal carpal ligament are incised longitudinally The periosteum is stripped off the ulna (Fig. 113)



IV—The head of the ulna was resected (Fig 114)

ANATOMY OF THE HAND

Fig 115 and Fig 116—THENAR AND HYPOTHENAR MUSCLES LONG FLEXOR TENDONS OF THE DIGITS LUMBRICALS FIBROUS FLEXORS SHEATHS

The Median nerve supplies all the thenar muscles (excepted for the Adductor pollicis and the deep head of the Flexor pollicis brevis) and the two first Lumbricals

The deep branch of the Ulnar nerve supplies the hypothenar muscles the two medial Lumbricals the Adductor pollicis the deep head of the Flexor pollicis brevis and all the Interossei

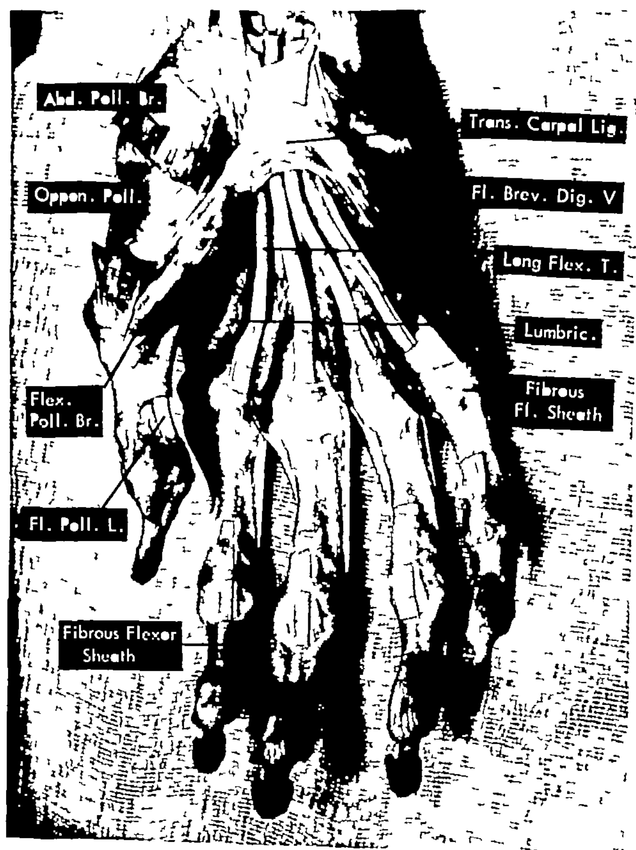
The four Lumbricals are located in the palm between the flexor profundus tendons The Lumbricals arise from the radial sides of the profundus tendons and insert into the radial sides of the extensor apparatus of the corresponding digits and at the proximal phalanx However the two *medial Lumbricals arise from both adjacent profundus tendons* This accounts for the greater freedom of motion of the index finger The surgeon can reach the interosseous layer of the index and middle fingers without damaging the first and second Lumbrical muscles

Within the proximal fibrous sheaths on the proximal phalanx, the flexor sublimis tendon bifurcates and the profundus tendon glides through the sublimis

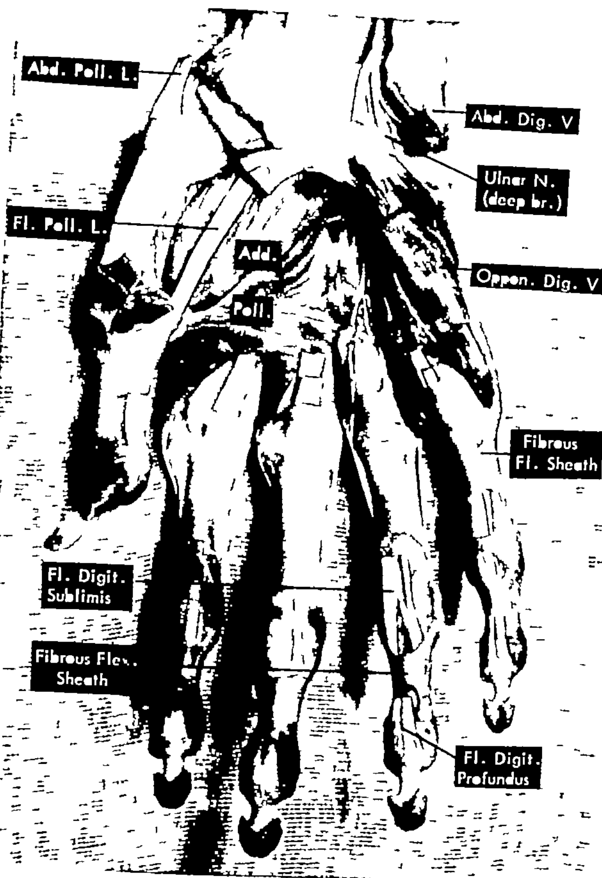
Observe insertion of the sublimis tendon into the sides of the middle phalanx. The profundus tendons are inserted on the proximal volar surface of the distal phalanges

Observe the insertion of the first and fourth Lumbricals on the proximal flexor fibrous sheath

THENAR AND HYPOTHENAR MUSCLES LONG FLEXOR TENDONS OF THE DIGITS LUMBRICALS FIBROUS FLEXORS SHEATHS



THENAR AND HYPOTHENAR MUSCLES LONG FLEXOR TENDONS OF THE DIGITS LUMBRICALS FIBROUS FLEXORS SHEATHS





THE THENAR REGION

Fig. 117 The skin was removed The thenar fascia and the palmar aponeurosis are shown A nerve and Digital vessels are seen on each side of the Flexor pollicis longus tendon.



Fig 118 The thenar fascia and the palmar aponeurosis were removed. Observe the Abductor pollicis brevis and the Flexor pollicis brevis muscles

The Thenar or Recurrent branch of the Median nerve arises just at the distal border of the transverse carpal ligament and passes to the base of the thenar eminence The union of the upper with the middle third of a line going from the styloid process of the radius to the fifth metacarpophalangeal joint indicates the point of emergence of this branch The Thenar branch of the Median nerve supplies branches to the Abductor pollicis brevis the Opponens and the Flexor pollicis brevis The Adductor pollicis and the deep head of the Flexor pollicis brevis are supplied by the Ulnar nerve



Fig 119 The Flexor pollicis brevis muscle was partially resected In the deep layer observe the Flexor pollicis longus tendon and the Opponens pollicis muscle

Fig 120—ULNAR ASPECT OF THE RING FINGER

Observe

a—The dorsal Interosseous inserts into the dorsal expansion the hood, and into the base of the proximal phalanx
The four dorsal Interossei are abductors of the fingers
The first dorsal Interosseous inserts only into the base of the proximal phalanx for greater strength in the pinch
The Interossei and Lumbricals extend the interphalangeal joints through *the dorsal expansion These same muscles also flex the metacarpo-*phalangeal joints through their insertions into the hood and base of the proximal phalanges

b—The hood covers the head of the metacarpal

c—Fibers of the retinacular ligament arise from the proximal fibrous sheath *join the lateral band of the extensor expansion, and insert into the proxi*mal and dorsal aspect of the distal phalanx.
Owing to the retinacular ligament both interphalangeal joints flex and extend simultaneously

d—The collateral ligaments of the metacarpo-phalangeal and interphalangeal joints

e—The insertions of the Flexor digitorum profundus and sublimis tendons and their vincula brevia.
The Flexor digitorum profundus flexes the distal interphalangeal joint.
The Flexor digitorum sublimis flexes the proximal interphalangeal joint.
Both muscles flex the metacarpo-phalangeal intercarpal and radio-carpal joints.

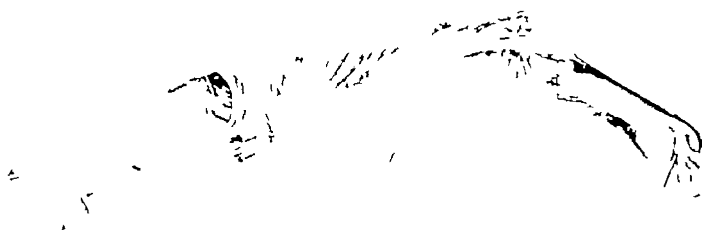


Fig 121—RADIAL ASPECT OF THE RING FINGER

Observe

a—The Lumbrical inserts into the extensor or dorsal expansion and into the proximal phalanx.

b—*The palmar Interosseous inserts into the dorsal expansion and into the* base of the proximal phalanx

The three palmar Interossei are adductors they move the index, ring and little fingers toward the middle finger

c—The hood

d—The vincula brevia

RADIAL ASPECT OF THE RING FINGER

Fig 122—DORSAL ASPECT OF THE RING FINGER

Observe

a—The extensor digitorum tendon with the connecting band from the little finger and its relationship with the hood.
The extensor tendon extends the metacarpophalangeal joint

b—The middle band of the extensor expansion inserts mainly into the base of the middle phalanx.
The laterals bands insert into the distal phalanx.

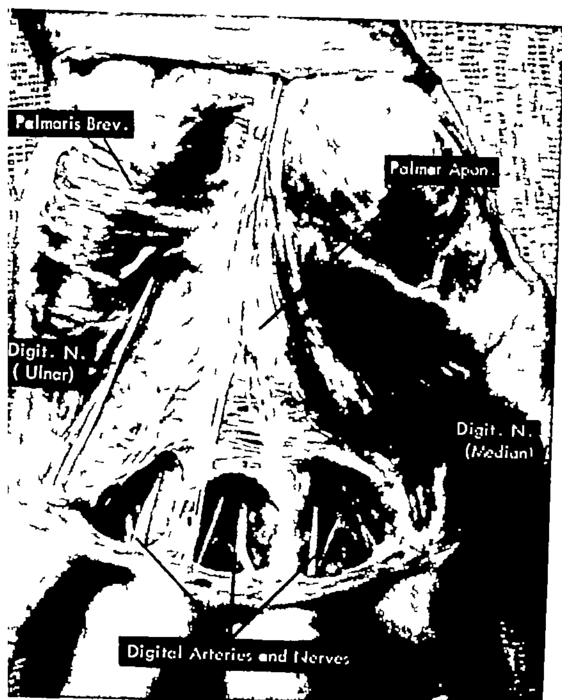
RESECTION OF THE PALMAR APONEUROSIS

From the deep part of the palmar aponeurosis arise the septa which come in close relationship with the fascia covering the Adductor pollicis and Interossei muscles, and distally with the metacarpal bones, the palmar ligaments and the fibrous sheaths of the flexor tendons

The resection of the palmar aponeurosis as done in a Dupuytren s contracture will illustrate the distribution of these septa and the tunnels they form for the long flexor tendons lumbricals digital nerves and digital vessels

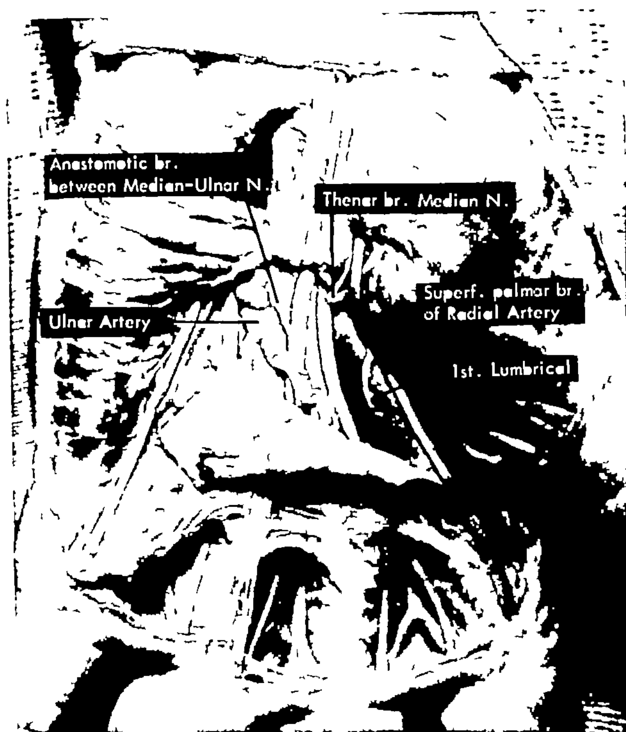


I—Transversal incision along the distal palmar crease The skin is dissected proximally and distally The subcutaneous fat is raised with the skin flaps
A longitudinal incision at the base of the thenar eminence may be necessary to cut the palmar aponeurosis and begin its resection A Z plasty may be performed on the skin covering the proximal phalanx (Fig 123)



The skin of the palm was removed to show the anatomical details of nterest to the surgeon

The palmar aponeurosis is triangular Along its radial edge are a ligital nerve (branch of the Median) and digital vessels Along its ulnar edge are a nerve (branch of the Ulnar) and digital vessels (Fig 24)



III—The palmar aponeurosis was cut transversally proximally than usual to show its relationship to the Recurrent branch of the Median nerve This branch will not be injured if both edges of the palmar aponeurosis are identified and if the section is done with the scalpel under visual control. It must be remembered that the Recurrent branch of the Median nerve is located at the junction of the upper and middle thirds of the line between the styloid process of the radius and the fifth metacarpo-phalangeal joint.

The subaponeurotic fat herniates when the palmar aponeurosis is transversally cut

No septa are present in this area the branches of the Median and Ulnar nerves and the superficial arterial palmar arch lie free in the subaponeurotic fat (Fig 125)



Observe the first septum The flexor tendons of the index pierce the first tunnel (Fig 126)



V—Observe the second septum The Digital nerve Digital vessels and the second Lumbrical pierce the second tunnel (Fig. 127)



VI—The second septum is cut deeply at its base The Lumbrical herniates when starting the cut particularly if made with the scalpel (Fig 128)



VII—The Digital nerve Digital vessels and the second Lumbrical have been freed
Observe the third septum and the entrance of the tunnel for the flexor tendons of the middle finger (Fig 129)



VIII—Observe the fourth septum and the tunnel for the Lumbrical Digital nerve and Digital vessels (Fig. 130)



IX—Observe the fifth septum and the entrance of the tunnel for the flexor tendons of the ring finger (Fig 131)



\—Observe the sixth septum In this specimen the Lumbrical has a sepa rate entrance to the tunnel from the Digital nerve and Digital vessels (Fig 132)



XI—Observe the seventh septum and the entrance of the tunnel for the flexor tendons of the little finger (Fig 133)